GLORY or GRAVITY,

The SECOND or

MECHANICAL PART:

WHEREIN

The Operations and Power of LIGHT in
GRAVITY, SEEING and COLOURS, with
ſome OBSERVATIONS on its joint Operators,
FIRE and SPIRIT,

Are Explained and Demonſtrated.

SO

Vulgar Errors about the Title of the SECOND
PERSON, and the Actions performed by his
Emblem in the Rule and Motion of Matter,
Detected and Corrected.

Taken from the Original MSS. of

JOHN HUTCHINSON, Eſq;

Late of the *Meuſe*, *Charing-Croſs*.

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Where the reſt of Mr. *Hutchinſon*'s Works may be had.

1870
1738
132

Is it possible that such learned nonsense could
have been written only 132 years ago.

THE

PREFACE.

WE *ſhould not have troubled the Reader with any Preface, but we thought it would be no little Satisfaction to thoſe who are engaged in the Study of the* Hebrew SS. *and are convinced that the Knowledge of Philoſophy is only to be fetched from thence, to hear that there are many* MSS. *of* Mr. Hutchinſon's *behind; which, God willing, ſhall be publiſhed as ſoon as conveniently may be; and we do aſſure them, that no Pains ſhall be wanting where it can be of any Uſe, without taking ſuch Liberties as we have not his own Warrant for.*

The following Treatiſe, to Page 86. *was fair writ out by himſelf for the Preſs, and was*

was to have been publiſhed the ſame Seaſon he publiſhed Glory or Gravity: *What he would have added more, we cannot tell; but the remaining Part on* Seeing, Colours, *and* Reflection, *with what follows on* Fire, *ſeem naturally to come under the Subject, and were taken out of three Rolls of Paper, which though they are not ſo exact as to Connection or Stile, as they would have been, had it pleaſed God to have ſpared him till he ſhould have reviſed them himſelf; yet are, we think, both connected enough, and clear enough, to explain what they treat upon, in a Manner more agreeable to Experiments, and to common Senſe, than hath lately been done.*

Theſe Rolls ſeem to have been written long ſince, and there are many others of the ſame Nature on different Parts of Philoſophy, rather Hints and Obſervations made at different Times, and at laſt paſted together, than what may be called regular Tracts.

It is to be hoped, however, that what is here offered the Publick, will not be without its Uſe: Thoſe who ſincerely deſire to find the Truth, will conſider every Hint, take what is beſt, and if any Thing ſeem to con-

contradict another Part, or what has been ſince explained, will take the Pains to correct it for themſelves in the Margin, or by making References from one Part to another, illuſtrate what is right, and diſtinguiſh.

Thoſe who chuſe to ſpend their Time in finding Fault, and in endeavouring *to pull to Pieces what others put together, may divert themſelves that Way: But let it be remembered, that as this and the others we deſign ſhall follow it, are poſthumous Works, ſome Allowance muſt of Courſe be made; and it is not every ſingle Expreſſion, or every ſingle Obſervation, we ſhall think ourſelves bound to defend. Should the main Subject be attacked in a fair candid Way,* and the Oppoſer write nothing that he ſhall be aſhamed to put his Name to; *it is to be hoped it will not want an Advocate.*

It may be expected, perhaps, we ſhould ſay ſomething of Mr. Hutchinſon *himſelf; it is certain there is Room enough, nor is it unuſual to ſwell a Book with Commendations of the Author, extolling his great Parts, Pains, &c. which, in many Inſtances, is evidently no more than an Attempt*

tempt to blind the Eyes of the Reader with a falſe Glare, and beſpeak his Approbation of the Performance by a prejudged Opinion of the Author; or at beſt is but a Proof that the Editor has a good Opinion of his Author, which is no Rule to any Body elſe.

If Mr. Hutchinſon's *Writings will not procure him the Love and Eſteem of thoſe who underſtand what he has writ, nothing can.*

GLORY OF GRAVITY.

The Second or

Mechanical Part, &c.

AS the Body of Man was made to be a Partner to the Soul, and put it in a State of Probation to qualify it for a good or bad State hereafter; and the only End of creating all the Matter of this Syſtem, and of forming all the Powers in it, particularly in the Light, is for the Production and Support of the Bodies of Men while they are to ſubſiſt, and no longer: I ſay only, becauſe no Mortal has yet ſhew'd, either from Revelation or Reaſoning, that God has any other Uſe for Matter, or the Motions or Powers in it. Indeed ſecondarily, as Man in a State of Qualification could pervert the Deſign, it may be ſaid that all the Powers in it were to try the Soul of each Man, whether it would regard God as the Creator of the Matter, and the Former of thoſe Powers and Motions, or give up itſelf to Imagination, to the Senſes of the Body, and view them as original Powers. At the Time of Writing the Scriptures, Jew and Gentile, both Sides knew that the Light, the material Glory, did almoſt every Thing in common Courſe; not only the great Operations, but from the greateſt to the ſmalleſt; and as the Gentiles, the greateſt Part of Mankind, had gone wrong, Part of the Scriptures were writ to ſet Men right in that Point. For Man was not only to aſcribe Glory to the Original, the ſecond Perſon, for his ſpiritual Rule, Redemption, *&c.* but alſo for that he performs by his Emblem: And as Glory is the Name of him who rules in the ſpiritual Senſe, ſo Glory or the Gravitor, for there is no Action without an Agent, is the philoſophical or phyſical Name of that Agent which rules in chief in inanimate Matter, in material animated Bodies, *&c.* And as thoſe who pretend by their own Righteouſneſs, or any other Way to ſave themſelves, do what they can to diſpoſſeſs Chriſt of his Glory, ſo thoſe who ſet up any other Agents to perform the Operations of Light, or allow its Operations, but make it independent, do what they can to deprive us of the Idea of him, and to diſpoſſeſs him of the Glory of creating and forming, and of the Operations of Light.

I have ranſacked Antiquity to find the Truth in theſe Matters. I have not only ſhew'd the Opinions of the antient Heathens and Philoſophers in theſe Points, but ſhew'd that they were all conteſted between them and the inſpired Writers ſome thouſands of Years ago; that there never was any Diſpute antiently which were the Agents which performed the Work, but whether they were independent, or had other Powers in them which were incommunicable.

As many ſeem not willing to be determined by the Authority of the Scriptures in Points of Philoſophy, but have framed Schemes out of their own Heads, or taken them from Moderns; thoſe who framed them ſo contrary to Revelation, and without Pretence to Senſation or Perception, againſt which more than is neceſſary has been ſaid: And as others pretend to depend upon their Senſes, before I begin with them, we muſt examine how that Matter ſtands

As to what comes in by Senſation, that we may not be impoſed upon by truſting to our Senſes, we ought firſt to examine their Abilities and Uſes, know in what they act fairly and impartially, in what they act otherwiſe, and why they do ſo; ſo what Things and Actions they forcibly impreſs Ideas of, and of what they leave faint Ideas, which ſerve only to be ready at call for forming Deductions. I think I may affirm in general, that our Senſes were appointed Centinels to perceive and convey Ideas readily to us of ſuch Parts, and ſo much of Matter, ſuch Motions, ſuch Actions and ſuch Accidents, as are immediately neceſſary, beneficial, uſeful or convenient for us to perceive ſtrongly, thoſe for more diſtant Ends faintly, and ſtronglier or weaklier, as they are more or leſs ſo.

Firſt, that any viſible Part of Matter reſiſts any other viſible Part from entering the Space it occupies; that comparatively the conſtituent Parts of ſome Maſſes adhere ſtrongly, ſome weakly, and ſome continue looſe or unfixed: That by the Force of that fluid and generally inviſible Agent we are tracing, the Atoms of any Part are liable to be divided, and many Sorts of them to be re-united, and each

Part, ſmall or large, is liable to be forced relatively to carry its Space along with it, change Place with others, and each take new Neighbours. But whether all Matter is the ſame, what Sizes or Figures the Corpuſcles of each different Sort of Bodies and Fluids have, what is between thoſe Corpuſcles, what makes ſome liable to adhere and ſome to remain looſe, what that Agent is which makes them adhere, and how it impels one Part of Matter to divide thoſe of another, or to diſplace and ſeize the Place of another, and ſo proceed, they have very feint or no Powers to ſhew.

Next, as to what concerns the Matter of, and natural Motions or Accidents in our Bodies: 'Tis revealed, that the firſt of thoſe Microcoſms, as well as the inanimate Parts of this Syſtem, was formed out of the looſe Atoms of Matter at firſt created; and the Workmanſhip or Mechaniſm in the Diſpoſition of the ſolid, fibrous, tubous, porous and fluid Parts, and the Agents, are ſo contrived, that the known Preſſure without, and a much greater unknown, are not at all perceived, ſo do not hurt the moſt ſlender Tube: And the Laws by which the fluid and ſolid Parts move, will, I hope e're long, appear even more wonderful than in thoſe of the Parts of the great Machine I am now treating of: But at preſent, if any of them be out of Order, we are very ſtrongly affected; but if they be all in Order, and no Superfluity nor Defect, all goes on ſmoothly, and no Ideas, or very feint ones, are repreſented of them by our Senſes; becauſe it concerns us only immediately to know when there is any Superfluity, in order to remove it, or when there is any Defect, to ſupply it; and what we know of them farther muſt be moſtly by Deduction. As to Things which act without our Bodies, we ſee the Motions and Actions of other Animals, but have feint or no Ideas of what moves them; we ſee the Bodies of Animals produced from Eggs, the ſeveral Parts of the ſeveral Sorts of Plants produced from ſmall Seeds, in Succeſſion of Time, varied in Shape, and by Addition of inſenſibly ſmall Parts, increaſed in Dimenſion, *&c.* but cannot ſee how, or by what Means.

Where Matter acts upon Matter, I think I may ſay, there is a Neceſſity, and the Wiſdom of the Creator and Modeller thereby appears; that the Agent, which ſhews us every thing 'tis intended we ſhould ſee, and at the Time 'tis intended we ſhould ſee them, ſhould be every where, and act in every Place between us and the Things 'tis intended we ſhould ſee, where its Motion is not interrupted or diverted by Solidity; and that that which re-acts from each, that interrupts that Motion to our Eyes, ſhould be inviſible itſelf, or elſe we ſhould ſee nothing but that Agent; and as 'tis of Uſe to us to ſee the Things, and not that which ſhews them, ſo we have ſtrong Ideas of the Body at reſt or moved which interrupts the Light, and but feint or no Ideas of the Light, or how it moves; and it is alſo neceſſary, that the Agent which makes us hear every Thing we ſhould hear, ſhould be preſent where any Thing is to be heard, and between that and us, and that it ſhould be inviſible; otherwiſe we could not ſee for it; and generally make no Noiſe, otherwiſe we ſhould hear nothing for it; ſo for that which makes us ſmell, *&c.* And 'tis alſo neceſſary that the Agent which ſupports and moves every thing ſhould be preſent in every Place where there is any thing to be ſupported or moved: And 'tis neceſſary that that Agent ſhould be of ſuch a Conſtitution, and its Force and Directions ſo contrived and apply'd, that it ſhould not only in general, but in particular, ſerve for ſupporting every Thing, or Part, at the Time it is to be ſupported; and for moving every Thing at the Time, in the Directions, and in the Manner it is to be moved. The Parts of itſelf, of all other inanimate Matter, Vegetables and Animals, becauſe two or more material Agents cannot act at once in the ſame Place; and becauſe if there were ſeveral ſuch Agents, each to act upon different Sorts of Matter, or Things, ſo near in Place and Time as there is a Neceſſity of Sorts, or Things, being acted upon, thoſe Agents and their Motions would continually interfere with one another: And 'tis neceſſary that this Agent ſhould, in its ordinary Courſe of acting, not only be inviſible to the Eye, but imperceptible to our other Senſes; otherwiſe we ſhould ſee, feel, or, *&c.* only the Supporter or Mover, and not the Things ſupported or moved. And if the Actions of that Agent were perceptible by any of our Senſes, the Ideas of thoſe Actions would be continually preſſing in upon us, and diſturb thoſe Ideas which are of more Uſe, or more immediately neceſſary to us, as Thunder, Storms of Wind, *&c.* do.

So we have diſtinct, commenſurate Ideas impell'd upon us of our Motion from one Part of this Globe and thoſe Things which immediately concern us, and of the Motion of thoſe Bodies or Maſſes of Matter which we have Uſe for, or are benefited by; but we have no diſtinct Ideas of the Motion of this Globe, or of any Compreſſure of, or of any Reſiſtance in this Fluid, except our Bodies be moved with great Velocity; or of the Motions, or Diviſions, or Adheſions of the Parts of the Firmament, in which We, thoſe Things, and this Globe, are ſupported, and by which we and they move: We ſee that the Atoms of other Bodies and of our own adhere, ſome ſtrongly, and we find, that each weighs ſome leſs, ſome more; as that which makes us ſee Objects does not itſelf appear, ſo that which makes the Atoms of Things adhere, or weigh, does not make us ſenſible that it compreſſes and keeps the Atoms together, or that itſelf preſſes, or weighs; becauſe any ſuch Perception would continually diſturb us, and becauſe it does not immediately concern us, to know them; and chiefly becauſe, by knowing its Compreſſure, Weight, Reſiſtance, Motion, *&c.* we cannot alter them: So when a Ship or Body is ſupported by the Water, and driven by the Current, or Wind, if we be in the Ship, we cannot perceive whether the Ship removes from other Objects, or they from it; if we be out of the Ship, we perceive the Motion of the Ship or Body; but in neither Caſe but little how the Parts of the Water, which ſupports, and the Parts of the Water or Wind, which drives, the Ship or Body, ſhift Places. Though the Parts of either of them are much more perceptible than the Parts of the Firmament, which act in chief in the ordinary Courſe of Action, becauſe 'tis of little or no immediate Uſe to the moſt of us to know: And the farther any Body is removed from us, we ſee it under a ſmaller Angle, which gives us a very unjuſt Idea of the Sizes of the Globes in this Syſtem, and of the Stars. Our Eyes are framed to give us Computations nearly true of ſuch Diſtances as are immediately neceſſary for us to know, but very uncertain ones of greater, or of very great Diſtances; and I have ſhewed, Glaſſes do not aſcertain them; ſo are our Ears for Sounds: And our Senſes have ſtill more uncertain and fainter Ideas about the Agent which moves the Planets, and more eſpecially of the Motions of the Parts of the Fluid, in which, and I think I may ſafely ſay, by which, they are ſupported and moved. For the Ideas of Bodies in Motion, and of their Motions, go together; ſo where the Bodies are ſcarce perceptible, their

Motions are leſs ſo, and the Agent which moves them is likely to be ſtill much leſs perceptible. Though the Parts of this Fluid, in Expanſion, and its Conſequence, Compreſſion, make us ſee, hear, ſmell, taſte, feel, move, *&c.* and perform every Action upon all the Fluids and Solids in this Syſtem, they, or their Manner of acting in their common Courſe, are hardly to be perceived.

As *Moſes* ſays, *Gen.* i. 6. And the *Elahim* ſaid, let there be an Expanſion—— and let it divide——ſo the *Elahim* made the Expanſion, and divided —— ſo the *Elahim* called the Expanſion the *Names.* Hence the Subſtance of theſe are ſpoke of as the Eſſence of the *Elahim*, and the Actions of theſe, as the Actions of them, and *vice verſa.* So *Paul*, *Acts* xvii. 28. *For in him we live, move, and have our Being*; thus the Light expands, ſo Jehovah, *Iſaiah* xlii. 5. xliv. 24. expands; thus Light is the Gravitor, ſo Jehovah כבר Gravitor.

Theſe Agents, the Powers in them, and their Actions, are likened to them, their Power and Actions in another View, mentioned *Eccluſ.* xvi. 21. *It is a Tempeſt which no Man can ſee, for the moſt parts of his Works are hid.* Ver. 26. *The Works of the Lord are done in Judgment, from the Beginning, and from the Time he made them*;

This author is floundering about like the ancients not knowing any thing about the subject *them; he diſpoſed the Parts thereof; he garniſheth his Works for ever; and in his Hand are the chief of them unto all Generations. They neither labour, nor are weary, nor ceaſe from their Works; none of them hindereth another, and they ſhall never diſobey his Word.*

And I think, with Submiſſion, I may ſay, God has choſen the ſmalleſt to Appearance, and in our curſory Judgments, the moſt contemptible Means to effect the greateſt Ends, and which bring thoſe Ends about almoſt imperceptibly, not only in the inanimate Parts of the Creation, but alſo in the Vegetable and Animal; perhaps that we ſhould not aſſign the Actions to the Agents, or Means employ'd; perhaps to humble our Pride; perhaps to quicken our Application, and upon the Diſcovery or Contemplation thereof, to reward us with higher Ideas of his Wiſdom, Power and Goodneſs: And I think I may add, that God has in a Degree ſuited to our State of Trial, limited us from ſeeing, or himſelf from ſhewing his great Works, and thereby his Power and other Attributes, without our diligent Search, that we might not continually, againſt our Wills, be forced or frightened into our Duty, but drawn by the Cords of a Man.

And if God has created, and ſo formed and diſpoſed the Parts of Matter, which may be ſeen, perceived or underſtood, and made them the Means that they may act upon others, and perform the Operations to be performed in Nature, his Wiſdom will be more evident to our Capacity, than if he exerted his immediate Power upon each Part, or acted upon each by his immediate Power continually, and his Power will not be diminiſhed thereby: And as the Knowledge of theſe Things doth not ſufficiently ariſe from immediate Ideas impreſſed by our outward Senſes, we muſt try to view Matter with other Eyes, and in another Light, in order chiefly to diſcover what material Darkneſs and Light are, how Light is produced, what they do, *&c.* becauſe neither of them, nor any other Matter, can give any clear Ideas of them, or of their Actions, by any of our outward Senſes.

Brutes have no other Conception, but by material Impreſſions upon the Parts of their Bodies deſigned for thoſe Uſes, and the Body of Man perceives only by his Senſes, and thence ariſe the firſt Ideas of Matter: But Man reaſons of Powers in an Agent, without any compleat Idea of the Agent, of the Accidents which can befal

Matter after the Ideas are loſt by the Greatneſs of the Body or Smallneſs of the Parts, or after the Bodies are out of the Reach of our Senſes by Diſtance, or incloſed within other Bodies, of Animals, the Globes, or, *&c.* which is a Proof there is an Agent in Man, that ſometimes uſes not, nor needs viſible Objects for preſent Ideas: But I hope I need not go about to prove, that we have in each of us a latent Power which is of a manly Principle, doth not much regard or conſider the Ideas from outward Objects which are ſtrongly impreſſed upon our outward Senſes, and repreſent Things which immediately concern us, to ſupply the Neceſſities of our Bodies, but is deſigned to be employ'd ſometimes upon more noble Objects, often to more noble Ends; which can by Contemplation, ſerious Application, and regular Deductions from the gentle Ideas we have of Matter and Motions, which do not much affect our outward Senſes, frame comparative Ideas, and make us underſtand ſo far as is neceſſary, or in ſufficient Degree, what God has revealed to us about Matter and Motion, diſcover him and his Attributes by thoſe Works, particularly in thoſe great Actions upon which our very Beings every Moment depend, which Men ſeldom regard or conſider, and in performing of which they have no Share.

Pardon the Digreſſion. If a Man for Diverſion by Legerdemain, move Bodies quicker than our Eyes are uſed to trace Things, and pretend to ſhew and make the Mob believe that by hard Words and hidden Powers, ſome of thoſe Bodies pervade and paſs thro' Solids, become more or fewer in Number, are metamorphoſed out of one Sort into another, *&c.* though each remain the ſame, and of the ſame Magnitude: Does any one preſent, who can and dare uſe his Reaſon, conclude it muſt be ſo? No, he compares the other conſtant Obſervations he hath made, with what appears to his Senſes, obſerves him more narrowly and detects the Fraud, or declares his Senſes impoſed upon in thoſe Particulars, and their Evidence to be falſe, and determines that the Bodies were ſhifted through Fluids, ſome taken away, ſome added, ſome changed for others by Means, and in a Manner which his Senſes did not perceive.

If God for the wiſe Ends aforementioned, employs an Order of the ſmalleſt Atoms or Bodies in Form of a Fluid, as Means to move other Fluids, ſolid Maſſes or Globes, which by the Smallneſs of each of their Dimenſions, Figure, Fluidity, or Swiftneſs of their Motion, act in ſuch Manner that they evade our Senſes; and thoſe who pretend to deſcribe the Means and Manner of the Motions of thoſe other Fluids, ſolid Maſſes, or Orbs, be ignorant of, or hide the true Means or Manner, and ſay that thoſe Fluids, ſolid Maſſes or Orbs, are moved by Powers communicated from an Agent after its Action is ceaſed, by Laws not revealed, by Powers without Means to execute thoſe Actions, as has been ſufficiently hinted already; and ſtrive to dazzle the Eyes both of our Senſe and Reaſon with falſe Lights and falſe Evidence, and repreſent even Light itſelf in various and falſe Colours, that we may not ſee their Tricks and dark Practices, as Jugglers always do: Shall we depend upon our Senſes or their Words, as the Mob does, and conclude that the Author of Nature cannot uſe Means which can eſcape our Senſes, and that theſe Motions of the Globes, *&c.* muſt be performed by hard Words, and after an impoſſible Manner? Shall we let them treat us like Mob, and ſhall we act ſo? Shall we not exert that noble Principle in us, make Uſe of our Reaſon, compare our other conſtant Obſervations, conclude theſe Jugglers impoſe upon us, look for better Information, and by Means thereof endeavour to ſhew how thoſe Motions are performed. Let us try what we can diſcover thereby.

I borrowed this and the next Paragraph, inſerted in the ſecond Part of *M. P.* p. 52. I muſt repeat them. By the Power of God, the Matter of the Heavens and the Earth was created and exiſts; and by what I can gather from Scripture and Obſervations, in an immenſe, though determinate Number of Unites, and that each of them exiſts after a Manner we call Solidity, whereby each Unite is poſſeſſed of its Part of Quantity or Space deſcribed by its Figure, and limited by its Dimenſion or Extent, and thereby is impervious and inflexible; has no other Qualities, Virtues or Powers, nor no Inclinations, neither external nor internal, appurtenant, infuſed or annexed to it, nor iſſuing out of it, but is wholly paſſive, and liable to external Accidents, ſuch as reſting upon one another, being moved by one another, and being reſiſted by one another, and being rubb'd againſt one another in paſſing by one another, adhering to one another, and being diſſolved, or divided from one another, and changing Places with one another.

Thoſe Unites adhering in certain large Maſſes, in certain Forms, are called Solids by certain Names, as the Earth, the Moon, *&c.* and the Parts of the Earth, as Stone, Gold, Silver, *&c.* Thoſe which do not adhere, or but ſeldom, ſave only in very ſmall Maſſes or Grains, are called Fluids, and are of ſeveral diſtinct Species, as Water, Air, *&c.* And Unites diſperſed in them, which when collected, form Vegetables and Animals. Every Maſs when formed, and every Maſs now, has a certain Number of thoſe Unites or Parts in it, and the ſeveral Parts of each Species of Fluids have the reſt; each Species of Solids, and each Species of Fluids hath its determinate Number, and there is the ſame Number in all now, as was created.

Our Idea of a Body at Reſt, ariſes from the Reſiſtance it gives to ſome of our Senſes by the Parts of our Body, or by the Medium which touches it and ſome of them, and is in Proportion to the Dimenſion of its Surface, which by reſiſting, is perceived by ſome of our outward Senſes with Allowance for the Diminution, which Diſtance makes or ſeems to make.

Any Body which is ſo ſmall as to lodge in, or paſs the Interſtices, between the ſolid Parts which compoſe the Organs of our Senſes, or ſhelters itſelf between thoſe of other Solids or Fluids, or is as ſmall as the Parts of the Medium by which we ſee, cannot be perceived.

One of thoſe Unites is ſo ſmall, that it is not to be perceived by any of our outward Senſes, as an inviſible Indiviſible; therefore we can have no Idea of one of thoſe Unites from any of them.

If we can have no Perception nor Idea of one of thoſe Unites from our outward Senſes, we can have no Idea of the Manner in which it exiſts, nor no compounded Idea of the Unite with its Accidents from them.

But Numbers of thoſe Unites adhering in Maſſes, or adjoining in Fluids, are perceived by ſome of our outward Senſes; thoſe adhering in Maſſes, or which form groſs Fluids at reſt, reſiſt, and form diſtinct Ideas; thoſe which form the fineſt Fluid, even thoſe which pervade the Pores of the hardeſt Metal, and the Space they enjoy is termed a *Vacuum*, when put into Motion, are to be perceived by our outward Senſes, nay will divide the Parts of the Organs by which we perceive; which by Compariſon proves the Exiſtence of thoſe Unites, the Manner how they exiſt, and their Accidents. This is the higheſt, nay laſt Degree of Senſation here; and from this, the Idea of the Sufferings of thoſe who refuſe the Evidence offered by the Idea convey'd emblematically by the *Names* is taken; and if this were not ſufficient Evidence, we ſee thoſe ſmalleſt Parts in Motion can divide the Atoms or Parts of thoſe Solids which are the hardeſt, or have what is called the greateſt Degrees of Adheſion.

So if the Parts which compoſe a Maſs or a groſs Fluid, by reſiſting and refuſing to admit other Bodies into the Space they enjoy, diſcover Solidity, or if a Maſs, Grain, or Fluid, ſuppoſe even of Grains of the fineſt Fluid, which will not paſs the Pores of Glaſs or Metal, and ſo are capable of being incloſed or confined, by being themſelves reſiſted by a Series of other Matter, which reſiſts, or refuſe to let them yield their Places, and take new ones, and they thereby reſiſt, or refuſe to give their Places, and take new ones, they prove there are Unites which compoſe that Maſs, or that Fluid, which exiſt, and are ſolid; and if they are ſolid, they will be liable to the Accidents aforeſaid.

Whether the Matter contained in each Unite be the ſame, we cannot perceive, nor cannot conceive how there can be any Degree of Solidity or Difference in two ſolid Unites, each of the ſame Figure or Dimenſion; or in Solidity, between two of different Figures or Dimenſions.

But we can conceive, and comparatively perceive, that the ſeveral Sorts of Maſſes, and the ſeveral Sorts of Fluids, each of which we call by a different Name, may each be conſtituted of Unites, each Unite of each Sort of ſuch a particular Figure, or particular Dimenſion, as may make each Sort of Maſs or Fluid differently, or more or leſs liable to ſome one or more of the aforeſaid Accidents, which every Sort of Matter is liable to; that is, that the ſolid Atoms of each Species of Fluids or Solids are each of a peculiar Size and Figure, and that from the Difference in Size and Figure, they have their ſeveral Capacities, of being kept looſe or fluid, of adhering or being ſolid, of their different Degrees of Fluidity, Hardneſs, Softneſs, Ductility, Flexibility, Frangibility, *&c.* and that the Unites of the ſame Sort, by being differently ranged or diſpoſed, or by adhering one by one, or adhering firſt into ſmall Maſſes, and thoſe ſmall Maſſes afterwards adhering and forming large ones; or in Fluids, by each Unite continuing looſe, or by their adhering in ſmall Maſſes,

&c.

&c. may make the ſame Maſs, or the ſame Fluid, liable to different Degrees of the ſaid Accidents, by which, and ſuch like Differences, each Sort is diſtinguiſhed, and each Sort anſwer their reſpective Ends.

And we find thoſe Unites are formed ſo, or are ſo ſolid, that thoſe which compoſe thoſe Sorts of Maſſes or Fluids we make moſt Experiments upon, and are capable of being ſeparated and recollected, wear not by Friction, but preſerve their Figures or Dimenſions, which enable each Sort of them to be reformed into the ſame Species of Maſſes or Fluids, which gives a reaſonable Proof, that the reſt of the Unites, which conſtitute other Sorts of Maſſes or Fluids, retain theirs.

I muſt put a Caſe which I have no Idea of by Senſation, and ſo to me is Nonſenſe, in order to be underſtood. If one could have an Idea that empty Spaces could negatively ſubſiſt between Parts of the Surfaces of the Unites of the ſmalleſt Sort, and between Parts of their Surfaces, and Parts of thoſe of larger Sorts, when they adhere in Maſſes, where though ever ſo much compreſſed, we cannot conceive how they can touch in every Point; then the ſmaller the Maſſes compoſed of the

Unites are divided, and the more the Parts of the Maſſes are moved, in being divided in progreſſive Motion, or in the Precedence of the larger, and Recedence of the ſmaller in any determinate or limited Place, one would have a negative Idea that there would be leſs Matter and the more empty Space in that Place: Or that the ſame Matter would fill or poſſeſs the ſame Place, and leave more empty Space between its Parts, and ſo extend beyond the Dimenſion of the Place in ſome inconceivably ſmall Proportion.

But if the ſmalleſt Sort of Unites come ſo near our Definition of a Point, that in an infinite Compreſſure they touch in every Point, not only of one another, but of all other Sorts: Or if Matter be poſſeſſed of all the Space in this Syſtem, the Parts of a Maſs or Body when divided, take not up a larger Space than the Body, when the Parts were adhering took up; and the Intervals, be they ſmall or great, at leaſt thoſe larger than one of the ſmalleſt Sort of Unites, muſt be filled with other Matter; and what they call a *Vacuum*, muſt have as much Matter in its Dimenſion, as if the ſame Dimenſion were filled with a Diamond, and its Pores with Atoms of the ſmalleſt Order. This is what the Scriptures call full; and as Senſe can have no Share in the Diſpute, every one that will imagine, may imagine which pleaſes him.

And ſince Solidity and Fluidity, in Compoſitions of Unites, are but Accidents, but comparative and temporary Terms, and that of thoſe termed Solids, ſome are more ſolid than others, and that of thoſe termed Fluids, ſome are more fluid than others; and that moſt, or all of the Sorts of Solids, can by the Motion and Intervention of the Parts of ſome of the Sorts of Fluids, become for the Time fluid, and upon the Ceſſion of that Motion and Retreat of the Parts of the Fluid, return to be Solids; and that moſt Sorts of the Fluids, by the Motion and Intervention of ſome of the Parts of the other Sorts of Fluids, can become more fluid; and upon the Ceſſion of that Motion and Intervention to a certain Degree, will become ſolid, and that the Parts of the moſt fluid Fluid, are more fluid, as they are more divided by ſome of its Parts in Action or Motion, and become groſſer or more united into larger Maſſes, as they are leſs acted upon, or divided, by the other ſmaller Parts, and if that Motion ceaſed, perhaps would be ſolid: It follows, that the Maſſes or Unites of the moſt fluid Fluid, are poſſeſſed of all the Space or Interſtices between the Unites of all other Solids and Fluids, and that they in Motion can have Egreſs and Regreſs through between them, without ſeparating the Unites, or altering the Figures of the Solids, and without changing the common Degree of Fluidity in each Sort of Fluids, and as that Motion is increaſed, can widen the Interſtices, divide the Parts, *&c.* we muſt next enquire into the Cauſe of theſe Motions.

We have proved from Scripture, (and as I was not then there, nor has any other given any other Account, it muſt ſtand) that this Syſtem is compoſed of created Atoms; that it is round and full from the Center at the Sun to the Circumference, and bounded there.

That the Atoms which compoſe the Heavens, *The Names*, FIRE, LIGHT and SPIRIT, are each of the ſame ſolid Subſtance, and of the ſame Figures and Sizes.

That theſe Atoms are the ſmalleſt, and from thence and from their Figures have the leaſt Capacity to cleave to one another, or be concreted; but as it appears they in ſlow Motion and great Compreſſure are alternately formed into ſmall Grains, and as the Atoms of any Size or Figure in Maſſes cannot form Pores that the ſame Sorts of

Atoms can pervade, ſo theſe Atoms being the ſmalleſt, cannot form Maſſes with Pores, that the ſame Size of Atoms can pervade; ſo while the Atoms in the Grains adhere, the Grains muſt be conſidered as Solids; and as the Unites have the greateſt Capacity to be kept fluid, ſo each to paſs between the Surfaces of others which are looſe, or between the Surfaces of the Grains formed of them.

That thoſe Atoms in the Action of Fire have the Capacity of ſplitting the Grains of thoſe which adhere, and putting them into the Condition of Fire, and of ſending them out in Light, and of pervading the Pores, and diſſolving the Adheſion of the Atoms of all other Solids.

That thoſe in Light have the Capacity of pervading the Pores of all other Fluids or Solids, except thoſe Pores in the Grains compoſed of their own Species of Atoms, (if they can be proved to be Pores) ſo are capable of keeping Fluids fluid, of expanding the Parts of Fluids or Solids, of being preſſed upon, and preſſing upon every part of the Surfaces of the Atoms of Solids or Fluids, except upon the Points where thoſe Atoms which compoſe the Fluids or Solids touch each other.

That the Grains compoſed of theſe Atoms, and called *Spirit*, are ſo large, as not to enter the Pores of other Fluids or Solids, but are capable of being preſſed againſt their Surfaces or Faces; each of reaching over a Pore, and preſſing upon ſeveral Atoms at once; ſo jointly of preventing the Atoms of other Fluids from exhaling too much, and the Atoms in the Surfaces of Solids from mouldering; ſo of compreſſing the Surfaces of Vegetables and Animals; ſo of being puſhed, puſhing upon the Surfaces of thoſe of its own Fluid, and of thoſe of other Fluids and Solids, which I have called Impulſe.

We ſuppoſe, that at firſt the *Elahim* formed, put and kept the *Spirit* and *Light* in Motion, by their immediate Power; and that during the Formation of the Machine, *The Names*, this Fluid was called, the Firmament, the Expanſion; and after it had ſeparated the Waters, and formed the Earth, they called it, *The Names*; and they by thoſe under that Denomination carried on, and finiſhed the Formation.

Philo, p. 416. *Nam cum ſit creatus & unus, veriſimile ſit eſſentias elementares particulares ſubjici cauſis cæleſtibus, quarum ipſæ ſunt effectus, ſicut accidit corporibus unitis, ut contineantur a ſe invicem.* P. 507.

P. 507. *Cætera ſuapte natura ſunt inania, quibus ſi quid ineſt ſolidi, Verbo Divino aſtringuntur. Hoc enim ceu vinculo & glutine ſolidatur omnis eſſentia.* 953. *Pruna eſt ignis in materia terrea, ſpirituali quadam habitudine pervadens totam uſque extremitates.*

Philo de mundi opificio, p. 9. *Atque ita ſibi perſuadeant, & in poſterum eam prolaturam eos ex cæleſtis Patris arbitratu, quoties ei placuerit non expectato cœli favore, cui dedit quandam potentiam, ſed non liberam. Nam ipſe quemadmodum Auriga habenas, aut Gubernatorem clavum tenens, dirigit qua vult recto more ac lege, ſingula, nullius ope indigens.*

P. 1152. *Hæc lex a mediis ad extrema, & a ſummis ad media protenſa, invictum natura circulum quaſi circenſe peragit, coaugmentans omnes mundi partes & adſtringens. Etenim vinculum infractum univerſi eam fecit ipſe Parens qui genuit. ibid.* 1154. *Lapidum igitur & lignorum, quæ abſtracta ſunt a coalitu, vinculum validiſſimum Deus fecit habitum, qui ſpiritus eſt converſa reflectens in ſeipſum. Incipiens enim e mediis in extrema tenditur: cumque ſupremam attigerit ſuperficiem, reflectitur rurſus, quoad eodem loci pervenerit unde primum profectus erat. Atq;*

hic eſt circularis curſus habitus. So *Job* xxvi. 6. *Extendens the* Covering upon the Abyſs of fluid Matter & *ſuſpendens terram ſuper* בלימה the Conſtriction.

And we ſuppoſe that *Jehovah Elahim*, by their immediate Power, put ſuch a Quantity of Atoms in the Action of Fire at the Sun, as would divide thoſe of the Spirit driving in: Such a Quantity of Atoms in the Condition of Light irradiating in ſtreight Lines from the Center at the Sun to the Circumference; and ſuch a Quantity of Grains or Spirit formed ſuch Atoms, concreted or adhering at the Circumference, and irradiating from thence into the Fire at the Sun, that as the laſt two, the Light and the Spirit, paſs oppoſite Ways, ſo thoſe of each Denomination, between thoſe of the oppoſite Denomination, each ſtrives to preſs thoſe on each Side ſideway, and that makes the whole form an Expanſion; that they thus ſet forward, continued thoſe Actions, thoſe Motions, and thoſe Effects.

That theſe Atoms and Grains which ſucceſſively and alternately compoſe this Fluid, *The Names*, after it was ſo ſet forward, became a ſelf-moving Machine, mechanically active; and that the Matter of all other Fluids and Solids are inactive and paſſive, and ſubject to *The Names*.

That this Fluid keeps itſelf in a perpetual Irradiation, or Circulation, at, to, and from the Orb of the Sun, and to and from the Limits, or Circumference.

That the Spirit, which is compoſed of Grains, and each of them of concreted Atoms of Light, is continually preſſed and driven from the Circumference to the thineſt Part of the Fluid, to the Fire at the Sun, melted or divided into Atoms, and preſſed out in Light, to the Circumference, to be reformed into Spirit, to ſupport the Circulation.

This Irradiation, which is viſible through Teleſcopes, beyond the Surface and Atmoſphere of the Earth, by its Vibration, cannot be perceived here ſo plainly as there, becauſe only the Light irradiates againſt the Surface of this Orb next the Sun, and the Spirit does not return from the Circumference regularly, or in ſtreight Lines to the Sun, but returns to the oppoſite Side of the Earth; and the Light cannot meet, and paſs through the Spirit; nor is it much perceived in the Diſk of the Earth Morning and Evening, becauſe of the Motion of the Fluid, which drives and is driven by the Earth. But every thing here is acted upon by that Compreſſion which ariſes from the Irradiation.

The Difference in Day and Night, Seaſons varying in the Condition of the Fluid, and in its Effects upon other Things, as appointed.

The Light which ſtrikes againſt this and the other moving Orbs in going out, and the Spirit which ſtrikes againſt them in going inward, and the Spirit which purſues thoſe Orbs in Motion, ſo are diverted from the Lines of Irradiation, as they are ſucceſſively left behind, reaſſume, or are carried on in their reſpective Courſes.

That theſe three, *Fire*, *Light*, and *Spirit*, were not only called *The Names* by the *Elahim*, but were appointed Rulers, Subſtitutes, and Repreſentatives of their Perſonality, mechanically to act upon, and govern the other Matter, inanimate and animate, in this Syſtem, as their Principals, whoſe Names they bear, do in a higher Senſe, and each to act the Part of him it repreſented, though the Light was appointed chief Ruler here, as I have ſhewed at large in the ſecond Part of *M. P.*

In Points where the Evidence is underſtood, Propoſitions about thoſe Points are eaſily underſtood; in Points where the Evidence has been neglected, and is not underſtood by others, 'tis difficult for any one who underſtands them to reduce them to Propoſitions which will be underſtood by others, 'till the Evidence be firſt ſettled; yet nothing will pleaſe now but in that way of Writing.

In ſuch a complicated Affair as Philoſophy, or Religion, Propoſitions are ſafer drawn from the Things ſtated, than they can be laid down before they are ſtated. Propoſitions about the Actions of this Machine, where ſeveral Agents act, where ſeveral Patients are differently modified, ſo as the Agency of the Agents will be varied, though true in groſs, will not be made fully, determinately expreſſive, without a vaſt Number of Limitations or Exceptions to each.

That we may not differ about Words, the Scriptures have furniſhed us with a proper expreſſive Name for every Agent in each of its Actions. They call the Matter of *The Names* in Grains, which cannot pervade Pores, רוח *Spirit*; that Matter in Atoms, or which can pervade Pores, when it gives Senſation to the Eyes, is called אור *Light*; when the ſame Matter expands, 'tis called רקיע the *Expander*; when it compreſſes, and ſo gravitates, 'tis called כבד the *Gravitor*; and ſo other Names for other Actions, to diſtinguiſh what the Matter is. I call

I call the Grains of this Fluid, *Spirit*, whether they be irradiating from the Circumference, or in that Motion we call Wind, or puſhing, or only compreſſing upon the Surfaces of Bodies or Fluids, or mixed in the Atmoſpheres. *Job.* xli. 7. *Superbia fortitudinis ſcutorum clauſa ſigillo arcto una in unam admoventur* & רוח *Spiritus non ingredietur inter eas.*

I call the ſeparate Atoms of this Fluid, *Light*, whether they be irradiating from the Sun or Fire, or in that Condition or Motion which gives the Senſation of ſeeing, which can pervade the Pores of ſolid Bodies, in ſtreight Rays, as through Glaſs, Diamonds, &c. in Form of Light, or through the Pores of other Bodies obliquely, without giving that Senſation to the Eyes, or mixed in the dark Atmoſphere, or in the Pores of Fluids or Solids, and expanding or compreſſing the Atoms of them. I need ſay nothing now of the Parts of this Fluid in Fire at the Sun, becauſe they act not immediately here.

The Preſſure of a Fluid, whoſe Parts are of equal Size and of equal Height, upon any Surface in the ſame Poſition will be equal or proportionable to the Diameter or Area of the Surface.

The Parts of this Fluid compoſed of Atoms and ſuch ſort of Grains, of different Sizes, will preſs with each Sort of them in Proportion to their Sizes.

The Proportion of Preſſure upon Surfaces naturally holds from the Area of the Diameter of a Yard to a Foot, to an Inch, to that of an Atom, to the different Sizes of Atoms in ſome Proportion, with Allowance for the Difference of the Preſſure upon thoſe Spirit comes at, and thoſe which only Light comes at.

The *Elahim* made the Spirit the Inſtrument of Impulſe, *Gen.* i. 2. So *Exod.* xv. 8, 10. and the Light the Ruler here: And all the Divine and Heathen Writings attribute, the Divine in a mechanical, the Heathen in a higher Senſe, all the natural Actions to them; ſo whatever the Spirit could not do, where-ever there was Action, even to a Point where the Spirit could not enter, or be preſent, that muſt be performed by that Agent (which nothing but the Subſtance of an Atom can exclude) by the Light, and ſo was attributed to it.

The Appointment of the Spirit was to be the Inſtrument of Impulſe, firſt upon the Faces of the Waters, on the outward Face of the Sphere, and on the inward Face of the hollow Sphere of Waters, whoſe Pores were then as wide as the Pores of moſt of the Fluids and Solids, whoſe Atoms were then contained in the Waters; and conſequently, as the Spirit could not then, ſo it cannot now, act in the Pores of the Fluids or Solids; acting within the Pores, and upon the Atoms of Fluids and Solids, was given to the Light, which entered and acted then, and enters and acts in thoſe of any Sort. So thoſe which cannot pervade the Pores will preſs on the Surfaces, and thoſe which can pervade the Pores will preſs upon the Surfaces of the Atoms in every Point where they do not touch each other, and there with each other.

The Spirit acts upon the whole Extent of the Surface of a Body, upon the Atoms and the Spaces, or Pores, which it cannot enter, as far as its Parts can touch; the Light only upon the Parts of the outmoſt Surfaces of the Atoms where the Spirit doth not touch, and upon the Surfaces of the Atoms of the next Courſe or Order in Succeſſion, which, as one may ſay, form another Surface; ſo upon the next Order, ſo on quite through every Surface or Order in the Body, and ſo upon the Surface of every Atom in the Body on every Point, except where thoſe Atoms touch one another.

The

The Parts of this Fluid differ from the Parts of all other Fluids and Solids in this, that by their Unites being ſmaller than the Pores between thoſe of the Unites of any other Species, that not one of them can be ſeparated or divided from the reſt of its Species, ſo thereby it ſupports every one of its own Parts, or itſelf and all other Matter in it, but preſſes upon Parts of itſelf or others, more or leſs, by Rules already hinted at.

When this Orb was a Sphere of Water mixed with Atoms for Solids, including an Orb of Spirit or Darkneſs, and atmoſphered by Spirit from its Surfaces to the Circumference of this Syſtem nothing ſtirred; when Part of the Spirit or Darkneſs was formed into Light, Motion commenced, and Separation and Formation enſued.

Irradiation, or the Manner of the Motion of Spirit and Light, is not then mentioned, but the Expanſion, which is the Effect of Irradiation, or ſuch Motion; and with Reſpect to the Circumference of this Syſtem, the Light expanded the Spirit outward; with reſpect to the Orb incloſed within the Sphere of Water, they expanded outward; with reſpect to the Atmoſphere which included the Sphere of Water they expanded, and ſo compreſſed inward.

No Atom can alter its Figure or Size, or take up more Space; but the Atoms and Grains in the Irradiation attempt to expand, as working Drink, when the Veſſel is full, or Steam of Light iſſued from Fire, and detach'd Atoms of Water, when 'tis iſſued into, and has filled a Veſſel, ſo lay a Preſſure upon every Atom of themſelves, and upon every Atom within them, and againſt every Part of the inſide of that groſs Fluid which bounds the Circumference, or upon the inſide of a Veſſel.

When the Light began to raiſe an Expanſion in the Spirit without and within the Sphere, the Spirit was, as it is expreſſed *Job* xxxviii. 9. *When I made the Cloud the Garment thereof, and thick Darkneſs a Swadling-band for it.* The Spirit could confine the Water from incroaching upon it, inward or outward, ſo that it could neither deſcend nor aſcend; and it could afterwards aſſiſt in turning the Sphere; but it could not enter into the Pores of the Waters. It, by poſſeſſing its Part of Space, could aſſiſt in the Expanſion, and help to lay a Streſs upon the Light, which pervaded the Pores of the Waters. But the Precept was to the Light, to expand, enter, and act in the midſt, among, between every Atom of the Waters, and to make מבדיל a Place, here a Sphere, a Diviſion between the Waters to the Waters; in ſhort, to form all the Parts of the Shell of the Earth.

Sorting the ſeveral Species of Atoms, which by their Difference in Size and Figure, make them fit to form Stones, *&c.* for ſeveral Uſes, making the ſmaller recede, and the larger accede, and form into Sands, Grains, Plaits, *&c.* by its Compreſſure, as Hail-ſtones, Snow, *&c.* are formed in the Atmoſphere.

Sinking thoſe Grains of the largeſt Atoms, and making the lighter or ſmaller with the Water riſe upwards, as appears in this preſent Shell, and of Courſe from below, from the Expanſion within, making the Grains of the ſmaller Atoms deſcend with the Water, and raiſing the larger upward, and with them forming ſolid *Strata* of diſtinct Sorts of Stone, and as far as we can ſee, or ſink between thoſe forming *Strata* of Coal, Chiver, Chalk, Clay, *&c.* whoſe Atoms are ſmaller; ſo of a far leſs, as they term it, ſpecifick Gravity. Forming the ſeveral Sorts of Nodules of Flint, of Iron, *&c.* moſtly approaching round, which are found in thoſe *Strata.*

Contracting and cracking the *Strata*, driving the Atoms of Metal horizontally, with the remaining Water, into the Fiſſures, and forming thoſe Atoms into Ribs, Maſſes, *&c.* of Oar, forcing the Waters above the Shell down, and ſo forcing the Spirit up out of the Abyſs, forming the Surface of the Earth, and many more minuter Actions were performed by this Agent the Light.

This was the Inſtrument by which the *Elahim* accompliſhed this great Work, ſo ſurely it may be able to keep Things in Order, form ſmall Productions, *&c.*

'Tis evident to me, from the Obſervations I have made upon the Parts of this Earth, as they are diſpoſed from the ſecond Formation after the Flood, which has taken up ſeveral larger Tracts than this to deſcribe them, that if the Spirit had not preſſed upon every Part of the inward and of the outward Surface of the Sphere of Waters, and the Light had not preſſed upon the Surfaces of each Atom in every Poſition from the Time they were at Reſt, while they were in Motion, till they were fixed, and after that with ſome Degree of Abatement, in Proportion to the Diſtance from each Surface of the Sphere, the reſpective Species of Atoms, and ſo of

Strata, Nodules, Minerals, *&c.* could not have been ſorted as they are, nor could the *Strata* have been formed ſolid, nor could any of even the more minute Accidents have been performed by theſe Agents.

When this Shell or Sphere of Earth was formed, the Waters above it carried down into the Abyſs, and the Mixture of Spirit and Light brought up and mixt with the reſt, with ſome floating Atoms or Vapours of Water or fluid Matter, and of vegetable or dry Matter, which riſe and hover near the Earth and fall, they poſſeſſed all the Space from the Surfaces of the Orbs to the Circumference; and the Mixture of Spirit and Light together, with the Fire, became a Machine, and the whole Mixture became an Atmoſphere to this, and ſoon after to each Orb, and ſo in Proportion to every Body which has been ſeparated from this Orb, or formed out of it. But as each Orb or Body interrupts Part of the Preſſure of this Fluid, the groſſeſt Grains would be ſucceſſively driven to the Surface of each Globe or Maſs, and form what they now call an Atmoſphere; and by the Rules aforeſaid, the largeſt neareſt the Surface, and by Degrees ſmaller and ſmaller to the Verge of each Atmoſphere, to be ready for their ſeveral Uſes; and conſequently ly a leſs Proportion of Light in each where the Fluid is thinneſt, that is, has the greateſt Proportion of Light in any given Compaſs near the Surface of an Orb, the Spirit in the Vicinity being more preſſed, and leaſt on the Side next the Light is driven in, drives it out and takes its Place, or mixes with it: And as each turning Orb interrupts the Light from the Sun by a Hemiſphere in ſucceſſive Rotation, the adjoining Spirit ſucceſſively preſſes in upon the hindmoſt Edge, and continues the Rotation and Progreſſion, as I have at large ſhewed.

No other Machine has the Power in its ſelf: Wind-Engines are moved by the Spirit, Water-Engines are moved by the Action of this upon the Waters, Steam-Engines are moved by the Force of the Light upon the Vapour of Water one Way, and by the Preſſure of the Spirit the oppoſite Way. This communicates the Force to the Animals to move the Machines moved by them. This Machine, *The Names*, has the Powers to move itſelf, and move that which moves others, and all Things which move, or are moved in it. This is, or theſe are the מלאכת the *Agent*, רקיע the *Expander*, שחקים the *Struggler*, צבאות the *Forces*.

The Power or Compreſſure of this Fluid, as a Machine, is exerted in every Point of its ſelf, and upon every Point of the Surfaces of Bodies and Fluids, and of the Surfaces of every Atom which compoſes them, either immediately by itſelf, or by preſſing upon, and ſo with others where they touch it.

Every Grain, and every Atom of the Fluid which compoſes this Machine, is preſt upon by thoſe which touch it, in regard to its Tendency behind, and preſſes reciprocally upon thoſe it touches, in regard to its Tendency before of its own Species, or others, in Proportion to each of their reſpective Surfaces: The Spirit upon the Surfaces of other Bodies or Fluids, where it can enter, the Light in ſmall Grains or Atoms, from the Sizes of thoſe which will paſs the Pores of Wood, Metal, Glaſs, down to thoſe ſo ſmall, that they paſs the Pores of a Diamond, preſs upon the Surfaces of every Atom, in every Fluid or Body, as fully as if each Rank of Atoms were formed into a ſeparate Plate, and diſtanced from each other, or were in looſe Atoms; and the Spirit and Light have the ſame Preſſure upon them too, within a Trifle, as they would have upon the Bodies ſplit into Plates, or reduced into Powder.

The Columns of Light, directly or indirectly, preſs upon every Part of the Surface of every Unite of other Matter alone, or which compoſes a Maſs or Fluid in every Direction here, as we ſay, downward, upward, horizontally, *&c.* except upon the Points where the Spirit touches, or where the Unites of other Matter touch one another, and there with theſe one another.

The Preſſure from that of the Spirit upon the Fire, and that of the Expanſion after, is continued upon the Light to any Depth in Fluids or Solids, and after it has paſſed through Shells or Spheres of both or either, tho' with ſome Degree of Abatement.

The Force of Light is ſtrongeſt, when it comes ſtreight from the Sun, and perpendicular to the Horizon, both in the Action of Pervaſion and Expanſion, and weaker as it comes more obliquely, to anſwer the Ends of Seaſons, *&c.* But my Deſign is to ſettle its general Power, before I enter upon the Degrees of it; ſo *Pſ.* xix. 5. *In omnem terram exivit* קום *linea* (the Subſtance) *eorum.* Ver. 7. ſpeaking of Light, *& non latens (eſt qui ſe abſcondat) a* חמתו *calore ejus* (its Effects in Motion). So *Job* xxxviii. 14. תתהפך *vertet ſe ſicut lutum ſigilli eſt* יתיצבו *ſtabunt ſicut veſtimentum.* If the Atoms of a Body could be taken out or annihilated, and the Spirit upon its Surface and the Light within were made ſolid and could be ſeen, you would have the Figure of the Body, the Figures of all the Pores, and the Impreſſion of all the Atoms; becauſe the Fluid of Light is always in the Pores of all Bodies, the Preſſure of this Fluid ſliding or ſhifting upon the Surfaces of the Body at Reſt or in Motion, and ſo upon the Ends of the Columns of Light in the Pores, is not conſiderably altered, except in violent Motion of the Fluid or Body, which augments the Preſſure, or when you alter the Poſition of the Body, ſo that another Part tends to the Earth, or, *&c.*

Theſe Actions are here, as it is beautifully expreſt, *Ecclus.* xxxiii. 15. *So look upon all the Works of the moſt High, and there are two and two, one againſt another.* In the Irradiation of the Agents, the Spirit acts againſt the Light, and the Light againſt the Spirit; but upon every Orb or Body, and every Atom in it, except the Sun, the Spirit, and Light, act in Conjunction in Expanſion, and preſs upon every Side, and ſo upon each oppoſite Side, two againſt two, both againſt both, and on which ſide ſoever the two are weakeſt, (whether from a leſs Proportion of Spirit, or the Vicinity or Interpoſition of ſome denſe Body, the Orb of the Earth, or, &c.) they yield, and the Body has Tendency or Motion that Way.

This Earth is now in a different State to what it was while it was forming, and would require ſome Compaſs to ſtate its preſent Situation and Condition, which is not before me now: But I think, if the Light did not, tho' with ſome Degree of Abatement of its Force, pervade this Orb, or re-act, which is much the ſame; and if the Strength of that Pervaſion were not increaſed by the Degree of Expanſion on the oppoſite Side, or the Reſiſtance weakened on the Side where it pervades, (ſo in ſome Places, and at ſome Times, more or leſs) the Gravity of Bodies would be much greater than it is, and many of the Phænomena in Nature could not be ſolved, particularly the raiſing of Vapours for Rain, &c.

If there had not been that due Proportion in Size or Figure among Atoms and their Pores, that thoſe of the ſmalleſt Size or ſmall Grains of them could have paſſed between the Atoms of Solids or Concretes, the Compreſſure of *The Names* would have driven all other Solids, as well as Loadſtone, Iron, Talk, &c. together. Since the

Earth was formed, theſe Agents have many other Things in Charge; and as CHRIST and LIGHT have each as many Names in *Hebrew*, as Offices, perhaps the Light, the material Glory, has almoſt as many diſtinct Offices in the material Senſe, as the Perſon it repreſents, without leſſening his Glory, has in the ſpiritual Syſtem. I have hinted at many, ſo I ſhall at a few here, *Iſa.* xlii. 5. *Expandens terram* (Adamah and Water) *&* *Germen ejus.* Ibid. xliv. 24. *Ego Jehovah faciens omnia Extendens Cœlos* (The Names) *ſolus ego expandens Terram* מיאתי *a mecum*, from my Subſtance, or my *Ath. Deut.* xxxiii. 13. *Bleſſed of* Jehovah *be his Land for the precious Things of the* Names, *for the Dew and for the Deep which coucheth beneath, and for the precious Fruits brought forth by the Light of the Sun, and for precious Things put forth* (Heb. thruſt forth) *by the Light of the Moon.*

The Expanſion of the Light of the Sun with Fluids, muſt be greater than the Compreſſure of the Spirit, or elſe Trees and Plants could not yearly ſwell or burſt the outer Bark, and extend in Diameter and Height; nor could the Bodies of Animals extend in Size.

The antient Heathens, who worſhipped theſe Agents for theſe Powers, invented In-

Inſtruments, and uſed great Application to obſerve the Motions of the Orbs, *&c.* the Effects of their Powers, and to examine, deſcribe, and extol their other Effects upon inanimate or animated Matter. In the common Courſe of Nature, theſe Agents were not intended to be viſible to Senſe, nor every minute Circumſtance to be underſtood without ſuch Application; ſo it had been enough for Believers to underſtand them in groſs, and to attribute the Creation, Formation, and ſo Powers, in them, to *Jehovah Elahim:* But as the Devil firſt, and the Heathens afterwards, aſſerted there were Powers in them which did not belong to them, it was neceſſary that *Moſes* and the Prophets ſhould exactly deſcribe what was in them, and how they acted, and ſo not only reclaim the ſuppoſed Powers in them, but thoſe which were really in them for *Jehovah Elahim*; tho' ſome modern Diſcoveries, made without any ill Deſign, have ſhewed us the Power of theſe Agents, beyond what was known to the Antients, by what yet appears; yet there never was a Time before this, when theſe Agents and their Powers were diſputed, nor ever ſo much Application uſed to deface all Ideas of them, and of the Ideas they give us of thoſe they repreſent, and in doing that, they have made more Enquiries, tho' without Succeſs, after the real Cauſes of Things; and in attempting to prove the contrary, have ſhewed more Methods of proving their Exiſtence and Power, than any of the Moderns knew any Thing of.

Perhaps 'tis ſo ordered, that when ſome Men ſhould uſe their utmoſt Art to make other Men Unbelievers, that the Evidence which ariſes from ſuch Diſcoveries, and the Enquiries and Experiments thoſe Oppoſers have made, ſhould enable others to give Evidence ſufficient to confirm the Authority of the Scriptures.

Out of the infinite Number of Texts I have produced, I ſhall inſert a few Hints which mention theſe Agents, their Commiſſion, Actions and Effects; and to the infinite Number of Citations from the Antients, I ſhall add one or two, *Job* xxviii. 25. *ad faciendum* to the Spirit משקל the Inſtrument of a ſmall determinate Weight. 2 *Eſd.* iv. 5. *Weigh me the Weight of Fire, meaſure me the Blaſt of the Wind.* Ibid. viii. 2. *Whoſe Service is converſant in Wind and Fire.* Judg. v. 31. As the *Shemoſh* (Light of the Sun, which the Tranſlators, as 'tis likely in the two next above, have generally conſtrued Fire) *which goeth*

goeth forth in his Might. Job xxxvii. 10. *A flatu* אל of the Irridiator *dabit gelu.* —— 11. *Etiam ſerenitas defatigabit nubem ſpargere, faciet nubem luminis ſui, & ipſa circuitus volvens ſe in conſiliis ejus ad operandum eos omnia quæ præcipiet eis ſuper facies orbis in terra.* Job xxxviii. 37. *Quis numerabit æthera in ſapientia? & defluxus cælorum quis quieſcere faciet in fundendo pulverem in concretionem & glebæ cohærerent.* Ver. 33. *Nunquid noſti ſtatuta cæli? an pones Dominium ejus in Terram?* Jer. xxxiii. 25. *Statuta*, of *The Names, non poſui?* *Pſ.* cl. 1. Render Irradiation to him, *in firmamento potentiæ ejus.* Job xxxvii. 18. *Expandes cum eo æthera fortia ſicut ſpeculum fuſum.* Pſ. lxviii. 35. *Et fortitudo ejus in ætheribus.* Prov. viii. 28. *In roborando ipſum æthera deſuper.* Pſ. lxv. 7. *Firmans montes in potentia ſuâ.* Pſ. xix. 2. *Et opus manuum ejus indicans Expanſio.* Iſa. xlii. 5. xliv. 24. *Expandens terram & germen ejus.* Pſ. cxxxvi. 6. *Expandens terram ſuper aquas.* 1 Par. xvi. 30. Pſal. xci. 1. xcvi. 10. *Etiam firmabitur Orbis ne nutet.* Pſal. xxiv. 2. *Terra & plenitudo ejus, quia ipſe ſuper maria fundavit eam, & ſuper flumina formavit eam.* Pſal. cxix. 90. *Firmaſti terram & ſtabit.* Why cannot that which concretes Water, concrete the Parts of Solids? If the Firmament called *The Names*, the Æthers, that Matter in oppoſite Motion, be the Agents in which is the material Power of *Jehovah Elahim*, then he made the Mountains ſolid, firm by *The Names.* Philo 960. *Quænam pars terræ (ut inde incipiamus) minuatur & tandem abſumatur vetuſtate nimia; ſaxa duriſſima nonne putreſcunt per imbecillitatem ſui habitus? Qui eſt intenſi ſpiritus tenor quidam, vinculum haud ſane rumpi facile, quod tamen tandem rumpitur.* Ibid. 1168-9. *Quid lapides firmiſſimi nonne tumore purifico affecti putreſcunt tandem atque ab habitus infirmitate (qui tenor eſt ſpiritualis vinculumque fracturæ non immune, tametſi ægre eſt ſolubile) fragiles & fluxi in tenuem primum pulverem ſoluti, deinde conſumpti, tum demum prorſus evanidi abeunt? Saxa lignaque a cognatis divulſa habitu aſtrinxit ſeu vinculo valido; hic autem eſt ſpiritus revertens in ſeipſum; incipiens enim a medio pertingit ad extrema, moxque a ſuperficie curſum reflectit, donec in eum locum perveniat a quo primum profectus eſt. Hic eſt ille habitus curſus recurſusque indeſinens, cujus imitationem curſores poſt tertium quemque annum in theatris*

atris oſtentant tanquam rem egregiam & contentione digniſſimam.

I ſhall not inſiſt upon any *Data*, nor upon any Deductions from them; but upon *Facta* which come under Senſe, and ſuch Deductions as inevitably follow from them, without leſſening the Authority of Scripture.

The expanſive external Preſſure or Compreſſure of the Spirit, or thoſe Parts which do not enter or pervade the Interſtices between the Atoms of a ſolid Shell ever ſo thin, if the Fluid were equal on each Side, and no Solid or other Fluid interpoſed on one Side, would be equal, above, below, downward, upward, and inward, on every Side. But if the Fluid be thinner, or there be a greater Proportion of Light on one ſide, or, as the Caſe always is here, the Earth interpoſe on one Side, the Compreſſure is weakened in ſome ſmall Proportion on that Side.

If ſuch a Shell have an Aperture into it wide enough to admit the Spirit and Light, in Proportion to that without, when it is entered, if you ſtop the Aperture, the Mixture of Spirit and Light within, by the Compreſſure without, inward upon the Light in the Pores of the Shell, reſiſt and preſs outward, nearly as much as that without preſſes inward, ſo,as the Preſſure or Force of the Expanſion from the counter Motion of the Spirit and Light without, inward lies upon the Fluid in the Shell, thro' the Pores, in Proportion to their Wideneſs; when the Impulſe of Light without is increaſed by Motion, either from the Sun or Fire here, and that Light ſtrikes upon the Shell, it pervades, puts the Light within into Motion, drives out part, heightens the Expanſion within in ſome Proportion to its Quantity, Velocity, *&c.*

If you take off the Preſſure of the Spirit on any Part, inſide or outſide, by fixing a Veſſel, ſuppoſe a Cylinder, with a Piſton or ſliding Valve in the top of it cloſe to the Part ever ſo thin, and extract the Grains or Spirit out of that Veſſel or Cylinder, ſo that nothing but the Light which remains within, and enters to ſupply the Space of the Grains extracted, and the Preſſure upon that Light, with the Light through the Pores of the Veſſels inward, remains upon, and reſiſts the Part at firſt Sight, one might be ready to determine, that it appeared, that the Preſſure of the Spirit and Light on their Side, is greater than the Preſſure of the

Light on its Side, by the Weight of a Column of Water, whoſe Baſe is equal to the Part where the Spirit was taken off, and whoſe Height is thirty odd Feet, and that by this we could eſtimate the Difference between the Preſſure of the Spirit and Light, and that of Light alone; where, by a ſliding Valve, the Spirit can drive it out upon any Area, even almoſt to that of an Atom; and that if we could take off the Light alſo on the under or oppoſite Side, we ſhould find what the Spirit and Light preſſed upon a Surface of any Area, as aforeſaid.

A Plate as thin as a Bladder, or Goldbeater's Leaf, if ſupported, ſtops the Perváſion of the Spirit, and receives its Preſſure. If the Spirit acted upon the inner Surfaces, and for Example, a Piſton were of Wood, or any Matter hydroſtatically of the Weight of Water, a Board of an Inch thick would contain about 390 Times as many ſuch Plates or Surfaces: So about as many Times the Weight and the Preſſure upon the Board, would be 40,000 or more Times its Weight, as no ſuch Preſſure appears upon a Piſton, where the Preſſure of the Spirit is taken off on one Side, 'tis plain that the Spirit only acts upon the Surface.

This goes near to prove what the Spirit and Light preſs upon a Surface; but it neither proves nor diſproves, much leſs any Way meaſures the Preſſure of the Light. For beſides the Preſſure of the Spirit and Light upon the Surface of the Piſton, as they do upon the Bottom and Sides of the Cylinder, the Light has as much Opportunity to pervade the Pores of the Piſton, as it has theſe in the Cylinder; therefore the Light which pervades the Pores in the Piſton, equally oppoſes the Light which pervades the Pores in the Bottom and Sides of the Cylinder, and the Force in the oppoſite Directions of the Light, oppoſe, and nearly equal each other. And the Preſſure of the Spirit, and even of the Light upon the Surface of the Piſton, has nothing to do but to drive out, or ſhift the Light out of the Cylinder, to let the Piſton ſlide down to the Bottom: Nay, as the Bottom and Sides, which have alſo the Preſſure of the Light upon them, do not move or oppoſe this, it ſhews not even how much of the Force belongs to the Spirit, and how much to the Light. And if the Force of the Light were taken off on one Side, we could aſcertain the Force of the Spirit and Light upon one Surface jointly, I am not ſure we could do it ſeparately, and perhaps we might aſcertain the Force of the Light upon a few Surfaces, but not its whole Force.

So where the Surfaces of two poliſhed Plates are put together, the one takes off the Preſſure of the Spirit on one Side, and the other on the other, and no more. The Force of the Compreſſure of the Firmament is not meaſured by this, but only the Difference which the Spirit, as an Atmoſphere, makes upon the firſt Surface of Bodies, Animals, Vegetables, Fluids, *&c.* to preſerve the Adheſion of the Atoms on the Surface of Things ſolid; ſo while the Light irradiates near perpendicularly from the Sun againſt the Surface of the Earth or Horizon, and expands ſtrongly near Mid-day, till that Part be turned off into the Spirit. As Light expands the Juices in Animals and Vegetables, ſo Spirit prevents them from expanding too much or burſting, the Surfaces of Fluids from evaporating too much, preventing too much Light from forcing into Fluids; ſo keeping them in a due Mixture, or Degree of Expanſion, *&c.* which, though imperceptible, appears, when 'tis taken off on one Side, as above. This Compreſſure is limited when the Shell is,

and

and the Fluid is nearly at Reſt; and 'tis nearly the ſame, when the Shell is put into gentle Motion, or when the Spirit is put into Motion by the ſmall Difference that is made in the open Atmoſphere, by ſome adjoining Part containing leſs Spirit than there is there, and ſo in Proportion with the Advantage of its puſhing, which we call Wind. If the Difference in the Atmoſpheres were much greater, they would overſet all perpendicular Directions, root up the Trees, *&c.* as appears by ſome late Inſtances in the *Weſt-Indies*; if the Preſſure were much greater, the Light and it could not alternately prevail in Seaſons, and all their Conſequences.

As the Title, ſo Intention of this is to ſhew the Agent, which is the Cauſe of Tendency or Motion; the Reaſons of the Degrees of Motion or Velocity is not under Conſideration, but that of over weighing, ſo Tendency or ſlow Motion.

It is plain that if you place a Plate of any Diameter, and ever ſo thin, even to that of a Goldbeater's Leaf, parallel to the Horizon, that the Spirit preſſes upon it with a Weight equal to a Column of thirty odd Feet of Water, whoſe Baſe is equal to the Area of the Plate;

and if you weigh it in that Poſition in a pair of Scales, and after weigh it edgeways, the Difference will be ſo inſenſible as that it has not, that I remember, been taken Notice of. And as no ſuch Preſſure which is ſo much greater on one Side, and ſo no ſuch Tendency to a Point, appears upon thin Plates in the Air or at Reſt, it is evident that the Spirit ſupports very near as much on the low or under Side, and ſo is near equal on every Side. And if the Difference between Compreſſure of the Spirit and Light upon one Surface of Atoms downward, were ſuppoſed to be equal to the Preſſure of Light upon ſeveral Surfaces of Atoms downward, and ſo on the oppoſite Side or upward; yet as the Preſſure of Light is alſo nearly equal on a Body, Plate, or *&c.* above, below, or downward, and upward, and inward, on every Side or Face of each of its Atoms, ſo is Compreſſure, and the Exceſs of that towards the Side on which the Preſſure is weak is Gravity, and the Effect Tendency or Motion; and as the Tendency or Weight of the whole ariſes from the Difference in Compreſſure upon an infinite Number of Surfaces, even in a thin Plate, the Difference upon the two outer and oppoſite Surfaces, muſt on a thin Plate be very ſmall, perhaps not the 1000th Part, and in a thicker Body imperceptible. So if extending ductile Matter into thin Plates, or if ſplitting a Body or Plate into ſeveral Plates, and making more Surfaces, ſo that the Spirit may have a greater Extent to act upon, do not conſiderably alter the Gravity, then there was near the ſame Preſſure upon the new Surfaces before they were made.

A Grain of the Spirit being impervadable till the Atoms be diſſolved by Fire or Colliſion; ſo here a Solid is preſſed upon, and preſſes upon any Solid, or *&c.* more than one perhaps, as much as ſeveral Atoms of Light; ſo every Grain in proportion and all together, near a Mean. As the Preſſure of the Spirit upon a ſliding Valve or Piſton, is in Proportion to its Diameter, the Surface of the Valve or Piſton being as a Solid impenetrable to the Spirit: And though I have ſaid above the Preſſure of the Light comparatively upon the Surface of an Atom is leſs in Proportion to the Diameter of the Atom, the real Preſſure of the Light upon each Species of Atoms, does not appear at firſt Sight; or by what I ſhall ſhew now, otherwiſe than by the ſtrict Coheſion of ſome Species. But only the Difference of the Preſſure or Gravity, whether the Difference be in exact Proportion to the different Power the Light has upon each Species, or whether the Light has Power upon each Atom in Proportion to the Extent of its Surface or Figure makes ſome Difference, is not now the Queſtion.

If the common Mixture of Spirit and Light be incloſed in a Veſſel, or the ſmalleſt Aperture be made into a cloſe Veſſel, wide enough to admit its Maſſes on any Side above or below, and Bodies of any Figure were incloſed in it, beſide what the Light does in the Pores of Bodies, the Spirit exerts or acts with all its Force outward, inward, and in every Direction, upon every Part of the inner Surface of the Veſſel or Shell, and of every thing contained in it, becauſe it is kept in on all Sides by the Atoms of the ſolid Sides, and is continually expanded by the Compreſſion of the Light within, upon the Lines of Light through the Pores; and if ſeveral Couples of poliſhed Plates be placed in it Face to Face, each of them will adhere with near the ſame Force as if they were each Pair in the open Air; if exhauſted Glaſſes, ſuch as would burſt in open Air, were exhauſted in it, the Compreſſure would burſt them.

If a round Shell ever ſo thin and cloſe were covered by another, and that by another *ad infinitum*, and the Spirit were exhauſted, one Tube, whoſe Baſe were but the Diameter of a Pin, put in from above or below, or any Side, through all the Sides, with an Aperture between every Shell, would let in the Spirit and the Pores, would communicate this Compreſſure of the Light to every Sphere inward and outward.

If a cloſe Veſſel were divided by Plates one below another, without Communication, except by a ſmall Tube as aforeſaid, the Spirit in the firſt would ſupport the Top, and that in the ſecond would ſupport the Bottom of the firſt upon the under Side, and ſo on: So what is called the Preſſure of the Atmoſphere, is properly and really Compreſſure, or otherwiſe there would be the Quantity of ſo many Preſſures in the whole; whereas in Truth there is but ſo many Differences of the ſeveral Preſſures.

If each other Diviſion were exhauſted and no Spirit left in them, and the Tube went through them without Communication, it would be the ſame; the one ſide would preſs, and the other ſupport near equally upon thoſe void of Spirit, ſo *ad infinitum.*

So Surfaces or Plates one below another, incloſed or not incloſed, do not multiply the Preſſures of the Spirit, but only the Differences of them, ſo do not increaſe the Weight of each Plate more than the Difference between the Preſſure and Support of the Spirit upon each.

So the Preſſure of the Spirit on the lower Inſides of a Veſſel, or upon other Veſſels within it, or when divided into Spheres or horizontal Diviſions upon them, will add little to their Weight; becauſe the Light which pervades from below, ſupports the Spirit near as much as that from above preſſes it downwards: Where there is the greateſt Proportion of Spirit or the Grains largeſt, whether it be in the open Air or incloſed, and they driven nearer together by the Preſſure of Water, or be forced into the Veſſel, the Light attempting to paſs between them, produces the greateſt Degree of Expanſion. If that be in the open Air, and ſo leſs Spirit in a Veſſel, there it preſſes upon the Sides of the Veſſel, and prevails inwards. If that be within a Veſſel, and ſo leſs in the open Air, it preſſes with greater Force upon any thing within the

Veſſel, and upon the inſides of the Veſſel, and prevails outward; ſo if one Veſſel be within another, that full of the groſſeſt prevails, ſo from the greateſt to the leaſt Proportion of Difference. And though the Grains are heavier than the Light, beſides that, as they by Expanſion preſs near as much upward as downward, this would make little more Alteration in the Gravity of a Veſſel.

Theſe Effects would hold in Proportion, if the Pores of ſeveral Shells were ſmaller and ſmaller, and the Holes to admit the Fluid could ſtop the largeſt Claſs of the Grains or Spirit, and admit the next Claſs; ſo each a Claſs ſmaller and ſmaller, till there would be no Expanſion. When a cloſe Veſſel is full of Light, each Atom of the ſame Size, and near the Size of what we call a Point, there are no Pores among them into which another Atom can enter, except others be driven in with Force ſufficient on one Side, to drive ſome of thoſe within out through the other Side. And though thoſe driven in take the Places of thoſe driven out, they cannot, like Wedges in entering and paſſing between others of this Size, make an Expanſion, as ſuch can do in entering and paſſing between Grains of Spirit; ſo though there can be no Expanſion, yet the Force of the Light without through the Pores lies upon it, and every Action performed by Light upon Solids will be performed there, and the Effects of its expanſive Force upon Fluids in Bodies will be greater there, becauſe the Reſtraint of the Spirit is taken off. Hence the moſt ignorant and the moſt arrogant of Men was forced to own, that this which he called Æther, reflects Light in common Motion more than the common Mixture of Air without: Others, that it pervades the Pores in Bodies, freelier than it doth this their Vacuum, which indeed is looſe, and whoſe Parts can ſhift more freely.

No other Atoms can be formed ſo denſe, or with Pores ſo ſtrait as to ſtop the PerVaſion of the Atoms of Light, but they will paſs directly or indirectly, except thoſe of their own Order congealed, which is ſaid to be the State of thoſe in the Circumference or Confines of this Syſtem, I think hinted at *Eccleſ.* xvi. 16.

Though I have Evidence to Senſe, and ſhall give it to others what this Agent is, that it has theſe Effects, and can have an Idea of the Manner of its acting by one or a few Columns of it, yet the infinite Number of theſe Columns, and the different Ways they exert their Force, makes the Idea too complex to be conſidered at one View, and in that View inconceivable. But the Idea we can have superſedes all Notions of occult Qualities, of which, for want of an Idea of an Agent, we have no Idea.

As Spirit let in at ever ſo little a Hole into a cloſe Veſſel, or what they call a *Vacuum*, preſſes upon every Part, and would preſs equally upon any Number of Piſtons, as if the Paſſage were ever ſo wide, by Reaſon of the different Sizes of its Grains, whereby the Light from without on every Side, drives in the ſmaller between the larger, which act as Wedges to one another: So every Column or Line of Light which enters at, and is in the Pores of a Solid, be it ſtraight or crooked, will preſs equally upon any Number of Atoms, can be preſs'd as much behind, and can preſs as much forward, or have the ſame Force upon each part of the Surface of each ſucceſſive Unite of the Solid, except where other Unites touch them, as if each were of ſolid Diamond, and much more, becauſe by the Smallneſs, Dryneſs, or Looſeneſs of its Parts, it can act on each, not as a real Solid made with Branches to reach to each, would do where the Preſſure

ſure upon it would be communicated and divided among each; nor as Water does, where every Part it preſſes upon, ſupports a Part of the Column in Proportion, becauſe there is only a certain Difference in Preſſure upon itſelf: Beſides, the Preſſure of the Spirit which lies upon the Bottom of any Thing which contains it, or upon any falſe Bottom, where its underſide, and the Surface of the Bottom are poliſhed and touch; but becauſe the other Columns of Light through the Pores of the Body on each and every Side, except where the ſolid Unites of the Maſs reſiſt, preſs, and ſupport each, in each Part with equal Force, and every Part of every Column of Light preſſes equally upon the Surface of every ſucceſſive Unite within the Lines of its Baſe, near as much as if it preſs'd upon no other but only one, till at vaſt Depths it abate by ſmall Proportions. When the Light is within the Pores of a Solid, while the Body remains ſolid, ſuppoſe the Atoms of Light only preſſing, and not in Motion, every Atom of the Light has its full Force from the Compreſſure of both Spirit and Light from without, inward upon the Surface of every Atom it touches, it cannot be ſo ſhifted or put aſide, but every Column in every

Direction keeps it to its Point; nay, when they are ſhifting in Pervaſion, ſtill the ſucceeding ones are each ſucceſſively kept to their Points, to preſs where they immediately touch, by the Compreſſure upon every Line or Column, as aforeſaid. And its joint Preſſure with the Spirit upon the firſt Rank of Atoms, or its ſeparate Preſſure on the ſecond Rank, does not abate its Preſſure upon the third, and ſo on; only each Rank will contain fewer Atoms, as it lies nearer the Center; and each Atom is counter-preſs'd on the oppoſite Side, that the Difference is only ſhew'd here. So the Surfaces of as many Atoms within a Body as compoſe the outward or upper Surface, have each the full Preſſure of the Spirit and Light upon them, as much as the ſecond Surface, or third, or, *&c.* and will be preſs'd with the ſame Force towards the Center, or ſome Part of the Body; and conſidering how the Area of each of the Surfaces or Courſes of Atoms towards the Center are leſs and leſs, ſo upon every ſucceſſive Rank inward, to the Center, or, *&c.* abating for the Abatement of the Diameter or Area of each Surface nearer and nearer the Center, as if they were ſplit and cut into Plates. And the Thickneſs of any Body, as far as Gravity can be of any Uſe, makes little or no Difference; for where the Parts of Light below a certain Size can paſs the Pores of a Body, they paſs and act at any Thickneſs, as freely as Light paſſes through thoſe Bodies, which for their Cloſeneſs, Hardneſs, free Admiſſion, and Emiſſion of Light, we call Diamonds. And as the Preſſure of the Light upon each reſpective Atom, ſo Gravity muſt abate at vaſt Depths, ſo the Preſſure of the ſuperior Parts upon thoſe below, ſufficiently, and in ſome Proportion compenſate it.

Light, in the open Air, where it is continually in Motion, could not fix the Atoms in the Surfaces of a ſolid Body, and oppoſe and vaſtly overcome the counter Preſſure upon the inner Surfaces of each of thoſe Atoms by the Columns of Light from the oppoſite or other Sides, eſpecially on the under Side, where there is leaſt Reſiſtance, and ſo moſt Tendency that Way, or on the foremoſt Side in ſlow Motion. As the Columns of Light fix the Atoms within, where the Lines of Light in the Pores from other Directions fix each Line of Light, much leſs ſo well as the Grains of the Spirit which preſs much more upon a Surface than Light does, and which over-reach the Pores, and each takes hold of ſeveral Atoms at once.

Where the Spirit can enter the Pores of any Body, which is termed a Solid, 'tis ſo far from acting the Part of Light which keeps the Parts together, that it is expanded by the Light which is preſs'd in, and attempts to diſſolve the Parts of the Solid. Where Water can enter, Light does the ſame with it, fibrous Bodies excepted.

As the Grains of Spirit, in Proportion to their Sizes, enable the Light to expand with them, thoſe Bodies whoſe Pores are in Proportion leſs and leſs, even down to thoſe of a Diamond, and ſo admit leſs and leſs Grains, even down to an Atom, are in Proportion the ſtronglieſt compreſs'd to one another, and adhere the ſtronglieſt; though perhaps the Size or Figure of each Species of Atoms may vary the Proportion in ſome ſmall Degrees.

I ſhall for the preſent defer ſhewing theſe Aſſertions concerning theſe Agents in various Manners, and ſo in various Lights by their Effects, in various Poſitions, and upon various Subjects, by Experiments which have been made, and others which might be made, and the infinite Number of Deductions which may be fairly made from theſe mentioned.

As the Machine which rules this Syſtem may be termed a Fire-Engine or Machine; and as an Acquaintance of mine firſt put in Practice an Engine, to which he properly gave that Name, concerning which he afterward frequently conſulted me, which engaged me frequently to conſider the Powers concerned in it, and the Manner of their Operation, which has ſince, by varying the Application, been improved by another, and is the only Diſcovery worth Notice, which has been made of late Years, I ſhall take the Liberty to explain the Agents, and the Manner of their Action, as far as concerns what I offer, and produce them in Evidence of the ſame Agents, and the Manner of their Action in the great Machine.

The Iſſue is very ſhort; Whether what I call Light pervades and acts in the Pores of Fluids and Solids: Whether each Atom carries its Space, when it enters between, and ſo divides and expands the Parts of Spirit, or, &c. makes an additional Dimenſion where at Liberty, and attempts to expand where confined; ſo in Solids to preſs, compreſs, gravitate, &c. Or all theſe Actions are performed by imperceptible Properties.

Though almoſt every one has ſeen one of theſe Engines, I muſt mention a few of the chief Parts; all the Contrivance to repeat the Motions, and avoid Inconveniencies, is of no Uſe here, becauſe a few Strokes determine the Agent and its Power, and the Regulators only ſhew that the Power is infinite, if the Veſſels would hold. There is no Occaſion to deſcribe Dimenſions, Diameters, or Proportions. If the Diameter of the Piſton be but proportioned to the Steam, the Light iſſuing from the Fire, can raiſe out of the Water in any ſhort Time that anſwers this End.

It has a Fire-place walled round, with a Door on one Side, a Chimney from it upwards, a Grate at the Bottom, and Paſſage under to admit the Spirit: A Boiler fixed cloſe within the Wall, and over the Grate and Place where the Coals or Fuel burns; ſo when the Coals are fired, and the Door ſhut, the Compreſſure without drives the Spirit in through the Grate, the Fire melts it into Light, the Light has no Paſſage if the Door be cloſe, but up the Chimney with the Smoke, and ſometimes in Form of Flame, which is reſiſted there with the Preſſure of the Spirit, but through the Pores in the Brick-wall, or the Bottom of the Boiler. Thoſe which paſs the Pores of the Wall, except the Fire be very ſtrong, appear not in Form of Light: But thoſe through the Bottom of the Boiler, if a part of it were Diamond, there it would paſs in ſtreight Rays, and appear light to the Eyes; and where it is Copper, they would in a little Time appear in Form of Light, and continue to do ſo with a gentle Fire: And, I think, if collected through a Glaſs, would fire proper Matter.

The Impulſe is begun and continued upon the Light from the Sun, by the Impulſe of the Spirit ſucceſſively preſs'd into the Fire there, and the Compreſſure upon the Light in the common Condition of the Firmament, is continued from the Expanſion of the whole, produced by that of the Irradiation. This Light is only preſs'd or impell'd from the Fire, with the Force of the Spirit which is preſs'd into the Fire, and ſupported only by itſelf, and by the Compreſſure of the Light through the Pores in the Veſſels from without, inward. And as the Fire augments and melts more Spirit, the Spirit is driven in with greater Velocity, ſo the Light is driven out with the ſame Velocity: But the Force has leſs hold of the looſe Atoms, than it has upon Grains, ſo impels each Atom with leſs

Force: But as the Uſe of Light here is not for the Eyes, the Boiler has a cloſe ſpherical Top or Cover, with a Pipe whoſe lower End is fixed into the Cone of the Cover of the Boiler, with a Turn-cock in it, and the upper End of the Pipe, into the lower End or Bottom of a Cylinder, with a Piſton in it, made ſo cloſe, as to keep out the Spirit, but to ſlide or be preſſed from the Top to the Bottom, and from the Bottom to the Top. If the Boiler, Pipe, and Cylinder, were void of Water and Spirit, and only full of Light; if one had Sides and Top of the Boiler, ſo Pipe, Cylinder, and Piſton, which were without Pores, perhaps the Force of the Light in Motion might be near as ſtrong, nay, perhaps ſtronger, than the Preſſure of the Spirit on the Piſton: But as the Atoms of the Fluid of Light put into Motion, pervade the Pores of Metal, except they be driven into a Veſſel in ſo great Quantity, that they cannot pervade ſo faſt as they are ſent in, or melted from Spirit by Fire within; they cannot impel much, or give any great Degree of Tendency, but would melt the Sides; or except, when moved with the Velocity of Lightning, or *&c.* ſo as this Light comes through the Pores in the Bottom, it would then paſs thro the Pores in the Top of the Boiler in the Pipe, Cylinder, and Piſton, and its Force cannot be proved; thus a Cone, except it be armed with ſomething to ſtop the Pores and work with.

As this Diſcovery aroſe from obſerving the Steam ariſing from boiling Water, ſo this Boiler is filled three Parts with Water, and ſupplied. So ſoon as this Light operates, it not only forces into the common Pores of the Water, and pervades them, but extends the Pores, ſo diſtances and expands the Atoms of the Water, but impels the main Subſtance of perhaps Hogſheads of Water upwards; though the Unites of the Names or Light, are dry, and not liable to ſtick to the Unites of ſeveral ſorts of Things; yet by the Figures of the Unites of ſome of thoſe Fluids we call humid, they are enabled to detach, drive, and perhaps adhere to ſome of them.

Though Steam in the firſt Shape of this Engine drove out firſt the Spirit, and after the Water at each Puſh, and does the one, and would do the other; in this I ſhall ſuppoſe this begins with only Atoms of Light in the Top of the Boiler, in the Pipe, and in the Cylinder, if they can detach the Atoms of any Fluid or Matter, whoſe Surfaces are larger than thoſe of its own, and ſo can take more hold of them, act with a joint Force upon them and with them, which cannot pervade Pores, which by their Humidity or Clagginеſs will ſtick upon the Surfaces of Bodies, and ſo ſtop part or moſt of the Pores, they are enabled to apply and ſhew their Force.

When the Draught to the Fire is made ſo ſtrong, that the Light which paſſes the Pores in the Bottom and Sides of the Boiler, detach ſo many of the inactive and paſſive Atoms of Water, as form ריח *Odor*, Reek, (ſo Reekon) or Steam, a Fluid compoſed of Light and Vapour, here of Light, and Atoms of Water. To digreſs; This Mixture, is the Agent in it, is the Life by which all the Operations in Animals and Vegetables are carried on; *Job* xiv. 9. *Ab odore aquarum germinabit, & faciet meſſem ſicut plantatio.* Hence this was attributed to Him in *Jehovah*, whom the Light repreſented in a Sacrifice, and called *odorem* ניחח *quietis*, made by Fire, and this ריח is often mentioned in *Canticles*. But to return; The Light pervading, and proceeding, and driving other Light out, acts, thruſts upon the Surfaces of the Atoms of Water in Steam, drives them forward, and new ones ſucceſſively, till it can, with them, form an Atmoſphere *, and make ſome cleave ſo as to thruſt with them againſt the inſide of the Top of the Boiler, which will ſtop moſt of the Pores, and prevent a great Part of the Expence of Light, which pervades alone as ſoon as the Light comes in, or rather would come in faſter than it does or can go out. It with the Atoms of Water lays the whole Streſs upon the Surface of the boiling Water downwards, upon the inſide of the Top of the Boiler upward, and upon the Sides outward every way; ſo inward upon every Atom, and thoſe Parts which pervade outward, againſt the Preſſure of the Fluid without, inward. As ſoon as this Force amounts to a certain Degree, that it preſſes more againſt the inſide of the Boiler outward, than the Spirit preſſes againſt it on the outſide inward, it is contrived to turn; ſo open the Cock in the Pipe, and ſo open a Paſſage into the Cylinder, where it meets the underſide of the Piſton at the Bottom of the Cylinder, with the Weight of the Atmoſphere of Spirit upon it, which is equal to the Weight of a Column of Water, whoſe Baſe is of equal Area with the Surface of the Piſton, and its Height thirty odd Feet;

* *An inward Sphere.*

Feet; and as the Deſigner of the Draught of this Engine ſays, *By its Force againſt the Piſton countervails the Preſſure of the Atmoſphere, and permits it to riſe:* But I ſay forces it to riſe to the Top, and ſuſtains it there till it turn back the Cock, and ſtop the Progreſſion of the Steam, and then till cold Water be injected; and I think if the outward Surface of the Piſton were turned downward, the Preſſure upon its Face would be little leſs, ſo would loſe little beſide the Weight of the Piſton.

During the Action of the Progreſſion of the Steam into the Cylinder, as the Piſton riſes, the Light proceeds with the ſame Force from the Fire, detaches and drives on the Atoms of Water, forms an Atmoſphere, and makes ſome Atoms cleave againſt the inſide of the Cylinder, and the Bottom of the Piſton, to the Ends aforeſaid; and notwithſtanding the Direction of the Steam through the Pipe, lays a Streſs as well downward, *&c.* as aforeſaid, as it does upward, where the Piſton gives way.

The Light acts ſtrongly in the manner of Expanſion in the boiling Water. But by the ſmall Proportion of Water raiſed in Steam, as it appears when collected, the Atoms of Water muſt be each at that

Diſtance from other in the Mixture, that the Light can have little Advantage in that manner.

When the Cock is turned back, and the Paſſage through the Pipe from the Boiler is ſtopped, the Steam, with the Compreſſure of the Light which pervades the Pores in the Cylinder, would keep up the Piſton till the Steam ſhould pervade, or Atoms of Water ſhould coagulate and drop.

But when the Piſton is at the Top, it turns the Cock, and lets in a Jet of cold Water through the Side, and into the Cylinder; the Drops each immediately entangle with the Atoms of Water in the Steam, which they touch, and make thoſe Atoms paſs and ſubſide with them, and leave the Atoms of Light every where as they paſs, which makes a *Vacuum*, as they term it, near each Drop. The next Atoms of Water to each *Vacuum* are preſſed into that *Vacuum*, and ſo into that Drop or Maſs of Water, ſo more *Vacuum* is formed at each, till the Atoms of Water and Light be ſeparated. All the Atoms of Water collected into a ſmall Quantity of Water at the Bottom of the Cylinder, and all the Light be what they call a *Vacuum*.

As ſoon as this Precipitation begins, for the Action is almoſt inſtantaneous, as there is nothing but Light within, and that Light which pervades the Pores in the Bottom and Sides of the Cylinder, and through the Piſton, and is compreſſed inward, which attempts to keep the Light in, or to reſiſt its coming out; the Spirit upon the Surface of the Piſton overcomes the Preſſure of the Light upon the underſide of the Piſton, by the Weight of a Column of Water as aforeſaid, forces down the Piſton, and forces the Light in the Cylinder through the Pores in the Sides and Bottom, and even through the Pores in the Piſton, which when the Water is condenſed it has Liberty to do; and if the Pores in the Cylinder and Piſton did not let the Light which remains in it and fills it, after the Atoms of Water in Steam were dropped, the Piſton could not go down.

I have ſufficiently demonſtrated that the Light has a vaſt Force when it is ſeparated from the Spirit, and acts where the Spirit cannot enter, be preſent or act in raiſing the Piſton. But this Caſe of the ſecond Part, where the Spirit ſhews its Force and prevails, does not determine any thing about the Preſſure of the Light. For when the Progreſs of the Light through the Pipe is ſtopped, and the Water in the Steam dropped, the Force of the Light through the Pores in the Piſton downward, is ſet againſt that which pervades the Pores in the Bottom or Sides of the Cylinder upward, and neither of their Forces appear. But the Spirit and the Light upon the Surface of the Piſton expells the Light, and prevails with the Weight aforeſaid.

It is plain there is a much greater Force upon the Air in Motion, than the Preſſure of the Spirit upon the Piſton; becauſe that Preſſure with which the Spirit is ſucceſſively driven into the Fire, performs that Struggle in the Fire, and melts thoſe Grains of Spirit proceeding into Light; and beſides all the Force which goes waſte with that up the Chimney, &c. it gives Force to the Parts of Light which paſs the Pores of the Bottom of the Boiler into and through the Water, to lift and keep that vaſt Quantity of Water in Motion, detach Atoms of that Water, carry them through the Pipe into the Cylinder in Form of Steam with them, to ſtop moſt of the Pores in the Veſſels, and ſucceſſively to enter through the Pores of the Bottom, and ſupply the Expence at the remaining Pores, which the Atoms of

Water do not cover, and ſtop to preſs upon the inſides of the Veſſels in every Direction outward, and upon every Atom of itſelf inward, ſo to preſs upon the lower Side of the Piſton, overcome the Preſſure of the Spirit upon the upper Side of the Piſton, force it up to the Top, and would force up any further Weight in Proportion, if the Force of the Drift of the Spirit, and ſo Force of the Fire were continued and heightened as long as the Sides of the Boiler, Pipe, and Cylinder, could ſuſtain its Force, and without Vent or being cold, would burſt any Veſſel.

So wherever the Spirit is kept off on one Side, and the Light incloſed, and only compreſſed by that which pervades the Pores from without, inward, the Spirit preſſes with a Preſſure greater than that which removes the Light by the Weight of a Column of Water as aforeſaid. But when many of the Pores can be ſtopped, and the Light iſſue faſter than it pervades the reſt, it is plain it can overcome the Preſſure of the Spirit, *&c.* During theſe Actions the Light is always in the Pores, and on each Side of each Plate of the Parts of the Veſſel, or Faces of the Piſton, and notwithſtanding the Prevalence, ſo Direction and Pervaſion one way the common Preſſure reſts upon the Surface of each Atom the oppoſite way, which preſerves their Adheſion, Gravity, *&c.* And when there is Light, and not Steam within any of the Veſſels, they are formed arch-ways, and ſufficient to ſupport the Difference of the Preſſure of the Spirit: Theſe Motions and Actions do not conſiderably abate the Preſſure of the Light upon every or any Atom of the Sides or Piſton in every Direction, but they retain their Solidity and their Gravity, and the Preſſure of the Light below and above is near equal, except the Difference we call Gravity. And after the Water in the Steam within the Cylinder is dropped, the Light in the Cylinder preſſed from without, has the ſame Preſſure upon the Piſton upwards, and the Light through the Pores in the Piſton has the ſame Preſſure downward as Light without, and reſiſts and preſſes as much upon the Surface of every Atom in the Piſton facing it or upwards, or in the Cylinder facing it downwards, even while the Piſton is forcing it out through the Pores in the Cylinder, and in itſelf, as if it were at Reſt, or not incloſed: Nay when it is put into Motion, and as here has paſſed the

Pores of a Shell of Metal, Water, *&c.* it has the ſame Effect upon another Shell, *&c.* That the Force of Light is infinitely great, and ſufficient to perform the Taſks aſſigned, appears here in Miniature. But with what Force the Light within the Cylinder reſiſts the Piſton, or with what Weight it preſſes upon any certain Surface of any or each Species of Atoms, ſo upon each Surface in a Body in Succeſſion theſe determine not.

Becauſe ſome of thoſe who have not ſeen one of theſe Engines, may not, by what I have ſaid, apprehend the Evidence of the Weight of the Spirit, and the Force of Light, the Beam of this Engine turns upon an Axis as the Beam of a Pair of Scales; pendent at one End is the Piſton, on the other End the Forcer or Forcers; the Forcers are proportioned, that by the Preſſure of the Spirit upon their Heads, and their Weight, they may force down the Water in the Barrels, and ſo lift up as much Water in the erect Pipe, abating the Height of the Water under the Forcer, as the Weight of the Water, and the Reſiſtance of the Spirit upon the Mouth of Pipe, ſuppoſing it of equal Diameter, amounts to; ſo to lift Water the contrary

Way; and the Diameter of the Surface of the Piſton is proportioned to the Forcers, that when there is what they call a *Vacuum* made in the Cylinder, the Preſſure of the Spirit may puſh down the Piſton, and lift up the Forcers or Water, whereby the Preſſure of the Spirit is proved, and the Steam alone lifts up the Piſton, and overcomes the Preſſure of the Spirit upon its Surface, whereby the Force of the Light is proved. The Caſt of the Scales, the Weight of the Piſton, or the Friction not conſidered. For if the Forcers were taken off, or were not able to over-balance the Water and Preſſure on the Mouth of the Pipe, but ſtood ſtill, the Piſton would be raiſed and overcome the Preſſure of the Spirit. I conſider not the Weight or Difference of the Forcers in the Tendency of the Piſton, which would be if the Cylinder were open below, and that Spirit as well as Light could get to its underſide, becauſe if the Piſton or ſliding Valve be thin and light, that Weight is in Compariſon next to nothing.

Query. If the Weight of the Forcers have any Share in lifting up the Piſton in the Cylinder, and how much; it can or need be very little, becauſe their Weight nearly reſts upon the Water which they force or lift perpendicular. And *Query*, if the Steam could do any more than raiſe the Piſton againſt the Preſſure of the Atmoſphere, and how much.

Whatever Figure the Top of the Piſton ſhould be of, concave, convex, piramidical, *&c.* I think the Preſſure upon it would be the ſame as it is upon it Plane, and ſo upon the Diameter of any Body, how irregular ſoever the Surface be.

If inſtead of Water to raiſe Steam the Boiler were filled with common Air, or with Spirit, I think the Light which the Bottom, if it could be managed ſo as not to melt the Spirit, would expand the Spirit with that Force, that if, when the Piſton were down, the Cock were opened into the Cylinder, the Light and Spirit would force it up againſt the Preſſure of the Spirit on its Top, and perhaps overcome a greater Force, which would ſufficiently ſhew the Force of the Light, though it would not anſwer the Uſe of the Engine, becauſe the Spirit could not be condenſed or dropped, as the Atoms of Water are.

Whether the vaſt Quantity of the Water in the Boiler contributes by its Expanſion to the Force, or whether if the Bottom were of Iron to endure Fire, and only a Gallon or *&c.* of Water were put in at firſt, ſo a leſs Veſſel and leſs Fire would exert this Force, and to ſupply a Quart, or *&c.* at every Stroke, of hot Water would keep the Force going, deſerves to be tried.

SEEING and COLOURS.

BY a Ray of Light, I underſtand a very ſmall ſtreight Pillar of this Fluid, whoſe Corpuſcles are put into Motion chiefly forward; and backward in leſs Degree, ſome outward, and ſome others inward.

Every Pillar of Light is agitated in a ſtreight Line from the Center of the Sun, or, *&c.* till ſomething interrupt. In Proportion to the Solidity, Thickneſs, *&c.* of that which interrupts, the Light operates through it, or rebounds and operates in another Courſe; or to ſay the Truth, part operates through, and part is rebounded, in Proportion to the ſtreight Pores and Solids, and to the ſeveral Inclinations of the Surface it ſtrikes upon: That which paſſes or operates through in a ſtreight Line, if it ſtrike upon a parallel Plane, is rebounded in the ſame Line; thoſe which paſs not, but are rebounded from the firſt Surface, act in new Lines, till they be interrupted and re-rebounded to the Surface, and part paſs in new Lines, and part be re-rebounded, and ſo on fainter and fainter; and the Focus's will be found as well of Reflection as Refraction, by Sir *I. N.*'s Rules; I mean their Proportions: But from other Cauſes than thoſe he aſſigns.

I think Reflection rebounds moſt of the Corpuſcles by one Surface. Refraction diverts the Corpuſcles of Light by their ſtriking upon the ſeveral Corpuſcles in the Medium; each at the different Surfaces of the Corpuſcles or Maſſes they hit upon in the Medium. Inflection diverts or turns the Corpuſcles of Light aſide out of their ſtreight Motion into a new Courſe, by the Medium of the Air, or, *&c.* Light ſtrikes ſtrongeſt from the moſt ſmooth or poliſhed Surface; becauſe when the Surface is angular, the Rebounds of the Fluid are directed in ſeveral Lines at right Angles, to the Plains of the ſeveral Sides of the Angles on the Surface.

All Light from the Sun, a Candle, or, *&c.* moves in a Sphere from the Center, to the inſide of the Circumference, as far as it can, if nothing intervene, and is reflected from every Point of that inſide of the Sphere, or from what intervenes—— And let a Hole in a Window be made never ſo ſmall, there are millions of Reflections ſtrike at that Point. Thoſe in a Line from the Sun (if it be in a Line) ſtrongeſt. Thoſe from near $\frac{1}{4}$ of the Atmoſphere from the Earth, and from every Body or Space which can be ſeen from the outſide of that Hole: And if the Sides through which the Hole is made be thin, they croſs or diverge at that Point: So that if all but one Reflection were taken off, which ſtruck ſtreight or obliquely into the Room, you would only have Light in that Point, whether ſtrong or faint, in Proportion to the Reflection. If the Sides of the Hole were long *, thoſe Reflections would be re-reflected into the Room in different Lines. 'Tis the ſame Caſe upon a Lens: 'Tis not the ſame Rays which come in one Line to the Sides; but Rays repulſed by the Sides of the Room of the dark Fluid of the Air, *&c.* which diverge to diverſe Points, and the Rays or Pillars themſelves reflect one another, the ſtronger the weaker, *&c.* which makes a ſtill greater Agitation in the Focus. 'Twould be the ſame Caſe with the Eye, if the Pupil were ſo large, and Convex, as with the Priſm.

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* *Qu.* What I mean by long, if like a Slit? How if through a Gun Barrel?

Reflection of Light is performed (ſuppoſing Space full of the Fluid) by Corpuſcles that go backwards, as others go forwards the very Moment: As by the firſt Impulſe ſome Corpuſcles ſtrike one forward againſt the Object, another reverts, and moves others to ſtrike the Surface from whence the Reflection came, tho' ſomething weaklier: So that the Corpuſcles of a Fluid which reſt againſt the Surface of a Body, when that Fluid is puſhed, will be preceded by thoſe which were behind; and thoſe driven back, will puſh back and make others do the ſame in the Line they move to the oppoſite Body that bounds the Fluid in that Line.

There are ſeveral Things not conſidered. The Direction the Light has upon the Surface, and the Poroſity or Thickneſs of the Body. If the Light fall perpendicular, and all paſs through, you cannot ſee the Surface. If part paſs, and part be reflected, in Proportion to the Quantity which paſſes, and which is reflected, the different Surfaces will appear. If the Body be of divers Thickneſſes, it will appear of different Colours. Plates of Glaſs change Colour by being viewed ſeparate, or one behind another. And coloured Liquors, as Gall placed upon Cryſtal, change Colours by being laid on thinner or thicker, becauſe leſs or more Light is reflected. If the Surface be Convex, it takes in different Lights; and if there be but one Pillar of Light, it falls in different Directions, more paſſes in one part than another, part paſſes off, and is reflected back upon every Side, and repreſents the Lights from the Reflections. 'Tis true, where the Motion of Light is violent, or as we ſay, Fire, all Bodies appear near Red, and in leſs Degree near White. The various Angles in which the different Streams of Light interſect one another, may exhibit different Appearances; this may be tried by making Rays from different Holes croſs one another at divers Angles: So of three Holes to interſect, as the three Sides of a Priſm do. Cover the Side of the Priſm they paſs not, or paſs a Ray through it ſo as to interſect.

Sir *I. N.* thinks the Light makes Vibrations upon the Optick Nerves, *&c.* as Sound does upon the Veſſels of the Ear. The Fluid may paſs along the Nerves to the Brain, if they be empty from Fluids: But 'tis moſt likely that Light acts upon the Steam in them, and puts it into ſome Motion backwards which touches the Brain, for a Touch in any Part is conveyed by crooked Nerves to the Brain.

The Eye is not at all conſidered, as whether the Impreſſion be ſtrong or weak; whether it come in a perpendicular Line, or ſloping, and in what Degrees of Inclination, whether it come from the Center of Light, or from outer Circles, *&c.*

As he did not underſtand what the Spirit is, or how it acts, and expels or moves Light, ſo he could not conſider or ſtate its Share in theſe Actions: Nay, ſuppoſing this Atmoſphere, as he doth, to be compoſed of elaſtick Parts, he has taken no Notice of them; becauſe if he had ſtated that, Light could not have moved as he pretends it doth.

Conſider the Crown compoſed of round Rays and Balls moving at the Ends, ſo formed by the Spirit from the Reflection of the Side of a Bottle of brown *Madera*, ſhewn to *Lord* ——.

Conſider how eaſily this Fluid can paſs the Pores of our Bodies in the ſeveral Degrees of its Motion, and what Effects it may have.

If one were to ſtand in the Place of the Sun and the Orbit, which the Earth deſcribes by its annual Motion, were placed full of Suns, their Sides cloſe to one another like Bracelets upon a Thread, and each appeared but 2^{d} 30^{m}, there muſt appear Spaces between their Sides: So the Fallacy doth not proceed from the Diſtance, but from the Perception of Light. Do not Sir *I. N.*'s Spots of coloured Light appear the ſame? When the Light in its Courſe ſtrikes obliquely upon the Side of any Body, but more eſpecially upon the Side of a Bubble or poliſhed Body, by which and the other oppoſite Motions of Light, it forms Deceptions, or repreſents ſuch Appearances, as a direct Light doth not repreſent; upon which they have with great Pains pretended to ſhew the Manner how Colours ariſe.

If a Fluid were moved from every Point of a Globe, it could not move as he deſcribes it. 'Tis the ſame as in a Circle upon the Surface every Way, or in the Center of a Fluid.

The different Forces of the Reflection of Light, or the Expanſion in the Atmoſphere, may be proved by letting it in thro' a ſmall Slit at the Bottom of a Room, and meaſuring the Length each ſtrikes upon the Boards, as well in a ſtraight Line, as from the ſecond Reflections.

Query. If Air or Water, as Fluids, and having their Corpuſcles in Motion, may not reflect the Light more than Glaſs fixed, whoſe Corpuſcles ſhift not. Sir *I. N.*'s *Opticks*, *p*. 66. *Lib*. 2. and bright Corpuſcles go forward, or are reflected moſt ſtrongly, becauſe in the Line of the Sun.

I think the ſtraight Rays from the Object not only ſtrike the Eye through a Lens or Convex Glaſs, but thoſe which come from other Reflections ſideways, and increaſe Force; ſame of a Burning-Glaſs; ſame of the Eye.

Query. If it be not likely that the Corpuſcles of this Fluid are of the Figure of Lens's.

The Reflection from a plain is broader and broader, as you remove from it. The Angle from a Body to the Eye is a Point, and the Legs extended to the outſides of the Body.

We cannot ſee the Stars in the Day, becauſe the Motion from the Sun puts the Motion from them aſide.

Does not a Reflection from a dark Colour ſtrike the Eye weaklier than a bright one, and appear nearer?

Try this, either the ſideways Reflections upon the longways of the Priſm, or the Difference in Thickneſs of the Priſm, formed the oblong Spectrum, and the different Colours.

Query. What Figure would an oblong Lens repreſent, and what a Lens thicker on what Side than the other.

If the Difference in the Colours upon the Spectrum proceeded from different Reflections from without, from the Window ſhut upon the Priſm, or from other Parts, and became Partakers of the Colours of the Bodies from whence they were reflected, or fainter by the often repeated Reflections, their laſt Reflection to the Eye would be in near the ſame Degree, and not be ſtrong enough to move the Pillar to repreſent the Colour of any Body in them. The Senſation of Colours reaches but a little way from the Object, the Senſation of the Reflection from the Body to a vaſt Diſtance.

If ſeveral Hoops of Braſs, whoſe Sides were placed parallel to the Semidiameters drawn from the Center of the Arch of a Priſm, ſo that the Beams of Light ſhould all fall in the ſame Parallels, would not its Focus fall where it doth without them.

It is the Rebounds of this ſubtile Fluid, agitated from the Object to the Eye, which gives the Senſe of ſeeing, and if Sound can be conveyed out of a Glaſs Veſſel void of Air, nay even full of Air, and hermetically ſealed, through whoſe Sides Air cannot paſs, it is the Motion of this ſubtile Fluid alſo, which makes it ſtrike our Ears, and gives the Senſe of Hearing.

The Senſe this Fluid gives in the Eye, it is likely is either performed by moving the Steam in the Nerve, or after it has paſſed the Cornea upon the Nerve itſelf, whither the Air or other Agents cannot reach.

And I think the Motion I aſcribe to this Fluid by Means of the Sun, Fire, *&c.* not only thins or divides the Corpuſcles or Atoms of it, and thereby renders it capable of being moved, and become what we call Light: But the very Motion puſhes the Fluid from the Eye, or ſome other Place to the Object, and from the Object to the Eye, and ſtrikes our Senſe; for if the Senſe of Seeing be performed by Reflection, as they imagine, there can be no Seeing without ſome external Agent to put this Fluid in Motion, and Darkneſs is only an Abſence of this Motion.

If the Fluid be agitated too violently, the Eyes cannot endure it, if it be reflected too ſtrongly, it ſtrikes too hard, offends the Eyes, and affords not a diſtinct Repreſentation. By the Degrees of the Ferment of Light, and the Strength of the Rebound, we gueſs at the Diſtance of the Object; different Mediums, (which make us think the Sun nearer at Morn or Night, than at Noon when it is neareſt, and has leaſt of the Atmoſphere to paſs, or things nearer in dull Weather, and larger perhaps by a greater Refraction in paſſing more of the groſs Medium, in paſſing Fogs) make the Sun look red, *&c.* Light ſtriking the Eye through a Teleſcope ſtronglier deceives us.

As the Corpuſcles of the Fluid are more or leſs agitated or divided, and the Fluid made thinner or thicker, it repreſents brighter or darker, and in ſome Degree changes the Colours.

When the Fermentation in this Fluid is high enough to free Corpuſcles enough, to make the Air light enough, the Steam iſſuing from the Eye can either move, or the Eye can feel them, and cauſe the Senſe of Seeing; and Sparks and Flame are here formed of Corpuſcles of Matter, that are readily expanded and made by

Fire, and can put the circumjacent Fluid into a Ferment, to produce the ſaid Senſation. Shade is an Obſtruction of the Motion of that Fluid, which gives that Senſation by an opake Body, and is darker, as the Reflections of the Light are fewer or weaker. Darkneſs is a total Stop of that Motion. Seeing is performed by the Expanſion of the Fluid, and Diſtances meaſured by the different Lengths, and thereby different Preſſures of the Pillars of Light: When the Fluid is expanded moſt, it preſſes moſt, as by the Sun, Fire, *&c.* that we cannot bear it. Our Eyes are ſooneſt heavied or hurt by looking at Objects at great Diſtance.

I think we can fix our Eyes upon the Earth or a near Object, but not upon the Sky or a diſtant Object, without ſhutting or ſhifting them.

A ſmall Preſſure of Light is pleaſant, and a great one painful, as Preſſures are upon other Parts. Objects, as the Firmament, *&c.* ſeem nearer when the Light or Expanſion is weak, and at a great Diſtance when the Light or Expanſion is ſtrong. Can any one imagine that if two Perſons ſtand but a Mile frome one another, and conſtantly ſee one another, that the immediate Corpuſcles of Light, which ſtrike againſt the one Perſon, ſtrike the Eyes of the other, and ſo alternately and ſucceſſively, but that the Fluid by a trembling and vibrating Motion, quicker than the Motion of the Eye, rebounds a little, when it touches the one, and ſtrikes back all the interpoſing Parts of the Fluid towards the Eye of the other? For in a Reflection or Rebound of Light to the Eye, a Triangle from the Eye has the Plain of the Body from whence the Light was rebounded for Baſe, and as the Light rebounds from a Plain to near half of the Hemiſphere, it will ſtrike the Eye in any Point of that Space within the Length of the Rebound, with the Proportion or Size of the Plain, if the Angles at the Baſe be equal at full Breadth and diſtinctly; if one of them be greater than the other, leſs diſtinctly and ſo in Proportion. And Light reflects to all Points, from whence an Angle can take in any Part of the Plain or Surface for a Baſe, from the Side of a Globe to any Point; and the Corpuſcles which ſtrike our Ears, muſt move in the ſame Manner. When you ſee your Image in a Glaſs, you have two Rebounds from your Body to the Glaſs, and from the Glaſs to your Eye. It cannot otherwiſe happen in the Diviſion made in this Fluid by the Buſtle in Fermentation, but the Maſſes muſt be in great Variety of Size and Figure; and if it were true that all the Corpuſcles pervade the Body they ſtrike upon, except thoſe which rebound and repreſent the Colours; and if it were alſo true that Corpuſcles of different Colours were of different Magnitudes, each Sort might rebound with different Degrees of Motion, and affect the Eye differently; but how will that hold, when the Corpuſcles reflected from a Glaſs, ſuppoſe Blue appears Blue, and thoſe which pervade the Glaſs into a dark Room, appear Blue alſo? But may not thoſe Corpuſcles which have paſſed through Blue Glaſs into a Room, be rendered bright by Fire or Light in the Room?

If the Diamond admit none but the fineſt, the Colour which paſſes through will be bright; if Glaſſes, or Bodies mixed with Corpuſcles of diverſe Figures, admit Corpuſcles of different Magnitudes to paſs them, or alter the Ferment by abating it, or changing its Direction; thoſe Corpuſcles will have different Effects, or repreſent different Colours to the Eye.

If you ſuppoſe there are ten Sorts of Corpuſcles in this Fluid, to repreſent the different Colours, and that a Quantity of this mixed Fluid ſtruck continually upon a ſmall Globe of any one Colour pendent in the great Space, ſo as to be beheld on every Side; is it poſſible to conceive that $\frac{9}{10}$ of this Fluid ſhould reſt in the Globe, and that $\frac{1}{10}$ could rebound and ſtrike the Eye in any or every Point of Space where nothing intervened, or whither the Reflection reached? This is impoſſible upon ſeveral Accounts; for if one Pillar of Light of equal Diameter, reaching from the Sun to it, contain ſuch an infinite Number of Times the Bulk of the Globe, and were ſucceſſively driven forwards, the Globe would ſoon be full, and in the mean Time but $\frac{1}{10}$ would be rebounded: But the Quantity of the Fluid it reflects is an infinite Number of Millions of Times more, than can touch or come near it in the ſame Space of Time, and ſo ſucceſſively or continually. And two other Impoſſibilities attend this Notion, the Sun muſt continually or every Moment ſend out many Millions of Times more Matter than is in it, and that Matter ſo ſent muſt be annihilated to make Room for more to ſucceed it. If the Eye cannot take in all the Parts of a Plain or Surface at once, which is broad or of divers Colours, but muſt view them Line by Line, Part by

Part, or Colour by Colour, ſucceſſively or one after another, there muſt be a ſeparate diſtinct Reflection from each Point or Part, or Colour of that Surface to the Eye, and as many Reflections as the Parts the Eye divides the Surface into in the Time one is viewing it; and theſe Reflections are not only at that Point the Eye is at, but at any Point and every Point an Eye can view theſe Parts of the Surface at, and not at one Inſtant, but continually and ſucceſſively, as long as the Fluid, in form of Light, is preſent, and the Eye feels the Reflection from each Diviſion by a diſtinct Pillar or Angle of Light included within two Lines as aforeſaid; and if this Surface had a part of each Colour in Being, every one of them will be truly repreſented to all the Points, and to every Point aforeſaid, by or through the ſaid interpoſing Light. I think the Senſe of Seeing is conveyed by the Touch of the End of the Pillar or Triangle of this Fluid upon the Body, which reflects it to the Eye, as the Senſe of Touching or Feeling is conveyed from the Thing touched by a Stick, or which touches a Stick in ones Hand to the Hand; with this Difference, that we can only feel the moſt prominent Parts of a Surface with our Hand or a Stick; but the Eye, with this Pillar, can feel the Surface in all or every Part, though never ſo irregular, nay even the very Figures and Contextures of its original Corpuſcles from whence the different Senſations we call Colours proceed.

If the Surface be very ſmooth and denſe, it will repreſent no Idea but the Reflections of other Bodies, and this Touch is the ſame as would be given to the Hand by a Stick bent at ſuch an End but intire; this ſhews that it comes from the Texture of the Surface, becauſe where that is ſmooth, nothing is repreſented.

One cannot ſee an Object in a crooked Line, no more than one can feel a Body by touching a Stick which touches that Body by another Stick in ones Hand; becauſe as the Reflection or Motion of the Fluid is ſtraight forward, what reaches the Eye out of that Line, comes from a ſecond or another Reflection, and repreſents the Body at the End of the laſt Line only. The Reflection of a Body to a Plain which is ſolid or denſe, and poliſhed or ſmooth, will repreſent that Body at the Diſtance it is before the plain behind it. The ſmoother and denſer it is, the leſs Alteration it will make in the Reflection, and give leſs Senſation itſelf to the Eye.

If the Surface of the Glaſs be ſtraight, what Point of that Surface ſoever you look upon, the Point of the Surface of the Body which makes the ſame Angle to a Line in the Surface of the Glaſs from that Part of the Glaſs, as a Line from that Point of the Glaſs to your Eye, makes from a Line in a ſolid Surface of the Glaſs, is repreſented to your Eye; and by turning your Eye to the ſeveral Points in the Surface of Glaſs, you take in the ſeveral Points of the Surfaces of the Bodies which reflect at equal Angles.

Corpuſcles of Fire, or Light alone, lodge in Diamonds, Chryſtal, fine Glaſs, &c. and their Pores admit no Air: So if they be thin, they let only Light paſs; if they be thick, they reflect a great Part of the Light which ſtrikes upon them. Corpuſcles of Fire, and no Air, paſs through a burning Glaſs, or are reflected or rebounded from a Mirrour, which is the Cauſe of their being collected into a Point; or if the Glaſs be properly ſhaped, or the Face of the Mirrour denſe, and of a proper Figure. Teleſcopes do the ſame Thing with Light, as Burning-Glaſſes do with Corpuſcles of Fire; they collect the Corpuſcles which paſs to Points or *Focus's*, which ſtrike the Eye more ſtrongly, as the Corpuſcles of Fire in the *Focus* ſtrike the Bodies placed there, more forcibly than when they are diſperſed and mixed with Air. A Tube of Glaſs having the Air expanded, and hermetically ſealed, can admit nothing but Corpuſcles of the Fluid in Form of Fire or Light: I am not certain whether they can paſs in Form of Cold; and nothing but the ſame Sort of Corpuſcles can impel or move them. Hence is that flaſhing Light produced, which we ſee by rubbing ſuch a Tube.

If the Thinneſs of this Fluid could be deſcribed, and the ſmall Degree of Motion, which is neceſſary to ſtrike our Eyes with that Senſation we call *Seeing*, the Operation would not ſeem ſo difficult.

One may conceive that the Corpuſcles of Fire, or thoſe of Light, may be ſo ſmall, that they may pervade the Pores of any Body or Fluid; and if thoſe Pores were ſtraight, there would be empty Space, ſo that thoſe Corpuſcles put into Motion, might continue that Motion almoſt infinitely; but it is hard to conceive how they pervade in a ſtraight Line, without ſtriking upon, and being interrupted by the Corpuſcles of Air, unleſs the ſucceeding ſtill drive on thoſe which are interrupted. Solid Bodies interrupt the Corpuſcles of

Fire, and though they pervade, few go in right Lines, but in all Directions; thoſe of Light can pervade only ſome few ſolid Bodies of a little Thickneſs, as Glaſs, Chryſtal, *&c.* If a Pane of Glaſs a Foot ſquare were ſet, that the Light could ſtrike only on one Side, the Rays would come out diſperſedly at the other three Sides, as thoſe of Fire come through a ſold Piece of Metal or Stone; and as there are ſuch an infinite Number, ſome of them it is like get forward, tho' many be diverted.

If as many Leaves as Colours (each Leaf of one Colour) were placed one behind another in the Light, would not all the Beams be ſtopt and reflected, each at the Leaf of its own Colour, and what Colour would that repreſent to the Eye? For either they muſt reſt in the Leaves, or be reflected: That they are reflected is certain, becauſe if a Candle were to ſend them againſt a Wall White, thoſe which are reflected from that, can reflect Red Ones from the next Wall they ſtrike, and ſo on.

Des Cartes makes Light a Pulſion or Motion of the ſecond Element. *Vid. Cartes Princip. Par.* 3. *Sect.* 55, *&c.*

When any Body approaches near the Body of an Animal, the Pillar of Æther is interrupted, and the Steam within is let iſſue there; and when any Body is interpoſed at a Diſtance, it ſhortens the Pillar, and leſſens the Force: So perhaps Light, *&c.* is perceived by the greater or leſſer Force of that without, upon the Steam within.

The Figure of every Body is ſtruck upon the Eye by the Reflection of the Light from that Body; and every Part, as far as the Eye can take in within the Compaſs of that Point or End of it which touches the Eye. The Reflection from the Skie, or other Bodies ſtriking with different Strokes on each Side, make the Diſtinction.

Shutting the Eye-Lids, ſtops the Operation of the Æther from the preſent Object, and ſtills them: So that at their Opening, they are freſh to be acted upon by the Æther, from that or any other Object.

Can a Glaſs be placed ſo as to reflect the Image from another Glaſs, and ſo by Sizes of Glaſſes or Diſtance, contract the Figures?

The Eye takes in as much at once, as can ſtrike in at the little Hole directly to the ſenſible Part, and the Verges about that Space tranſverſly; the Verge on the right Side, on the left Side of the ſenſible Part, and ſo contrary on all other Sides.

If Light act mechanically, *S. I.* ought to have ſhewed that the Parts of it which conſtitute or repreſent this or that Colour, were adequate to, or larger than the Pores of the Matter they were ſtopt by, and that all the other Parts which conſtitute or repreſent other Colours, were leſs, or ſo figured, that they could pervade the Pores of the Body or Fluid, ſo that none of them ſhould ſtay to repreſent any other Colour, which is impoſſible; becauſe the ſmalleſt Pores would ſtop them all, and ſhew a Mixture of them all; ſo Colour muſt ariſe from ſome other Cauſe, and that they did not act by Fits as Bodies do which have Will.

An Unite has no Colour, becauſe it is imperceptible; that muſt ariſe from the Connection of them, or from the Poſition or Inclination in which you view the Surfaces of them adjoining in Fluids, or annexed in Solids.

Colours ariſe from the different Manners in which the Æther is ſtopt, not only on the Surfaces of the Maſſes or Unites which compoſe the Surface of the Body, but on their Surfaces which compoſe the Bodies to conſiderable Depths; in ſome

Bodies quite through; and you look againſt a different Depth, of ſuppoſe a Pane of Glaſs, as you incline more to an acute Angle with the Pane, and ſo has a different Colour.

Many Colours are formed upon the Surface of the ſame Body or Fluid by the different Reflections of the Sun; as it is going down, it gilds the Sides of the Clouds bright, after it is down yellow, then red, then duſk Colour, then grey, and all in an Hour.

Colours ariſe from Figures, are increaſed or decreaſed by different Degrees of Light: Thoſe Rangements of the Unites or Maſſes are but very few, and the Colours are increaſed in Number by the Means aforeſaid.

Perhaps, the more Light comes through the Object, the Whiter.

When ſeveral Sorts of Liquors are melted, and the Parts divided ſmall, they are tranſparent, when in Maſſes opake; ſo the Water under the Line is divided ſmaller and clearer than here.

What doth Light imprint upon the Eye? they ſay Figure and Colour. I think only the Figure of the Body or the Surface, and that Colour is but a Name for the Diſpoſition of the Corpuſcles or

Maſſes on the Surface, or as deep as the Agent penetrates; and that all Senſe on the Eye proceeds from the Obſtruction of the Agent; and that a Diamond which is compoſed of Corpuſcles, and not of Maſſes, but uniform, repreſents no Ideas at all, more than clear Water, *&c.* And the ſame Matter repreſents what they call different Colours, as the Parts of the Surface are variouſly diſpoſed, or as the Surface is variouſly turned or inclined.

This Fluid, like a Spirit, gives you the Impreſſion of every Body in a ſtraight Line, of the Reſt, Motion, *&c.* at a great Diſtance upon applying your Eye, and gives you notice Sleeping or Waking, of any conſiderable Action, by what we call Noiſe; ſo of Smelling; nay, forms and moves every Thing in your Bodies, ſo that nothing is left to you but the Directive Power.

REFLECTION of LIGHT.

THE fermentive Motion of this Fluid from the Sun, is repulſed or reflected in ſtraight Lines from the Plain it ſtrikes upon to all Places whither a ſtraight Line can be extended from any Part of that Plane, and to Diſtances in Proportion to the Force the Fluid had at the Rebound, and the Degree of Fluidity of the Fluid. In its new Courſe, when it ſtrikes upon a ſolid Body here in a clear hot Day, its Force is ſtrong enough to rebound it to other ſolid Bodies ſeveral Times, and that once put into Motion by the Sun, being interrupted by its Rebound or new Motion, can give a new Direction to the Light already in Motion; nay, can agitate Part of the Fluid which was before in that State we call Darkneſs, and by that Motion render it Light.

The Reflections of the Fluid from the Bounds of its Motion in the vaſt Space, as they come mixt to us, with the Reflections from the ſeveral Globes and Bodies, are weak or next Degree to Darkneſs, and repreſent what we call blue Sky, like a dark Body with faint Reflections. The Space being full with this Fluid, makes it poſſible for this Fluid to be reflected ſeveral Times in ſeveral Directions.

The Corpuſcles moved in that Degree we call Light are not ſtrong enough to pervade the Pores of Solids in ſtraight Lines. Thoſe in that Degree we call Heat pervade in all Directions ſtraight or crooked, but thoſe which move in crooked Lines repreſent nothing to the Eye but the Senſe of Heat.

Whether that Brandiſhing of the Light upon the Ground in very hot Weather be only the Rebounds of Corpuſcles of Fire and Light, or Steam riſing out of the Earth before Rain which meets them and cauſes that Hurry I am not certain: But I think it is only the Rebounds of the Corpuſcles of Heat with what they detach from the Surface.

Conſider how it is in Reflections of Light, do they as ſmalleſt divided ſtill move on by the ſame Rules however reflected till they unite with others and become of like Gravity and ſo reſt, and thoſe of greater Gravity ſucceſſively puſh back and take their Places according to their Gravity; and when their Motions are croſs one another in Fire, or different Reflections, doth not their Motion divide the Corpuſcles of Bodies?

They divide in the infinite Sphere as they recede from the Center, and mix amongſt the groſſer, till their Force is loſt, and their Number not ſufficient to appear, and then form Maſſes.

The lighteſt Part of the Æther ſeparated at the Surface of each Globe next the Sun, is that which we ſee white at this Diſtance, and is in the Figure of a Cap, with thin Edges and a thick Crown: That Cap appears plainly much larger than the dark Side of the Moon.

When the Puſhes of Light from the Sun go in one Line, they produce but little Heat, when ſeveral Reflections from ſeveral Surfaces meet by acting one upon another, they produce that Buſtle: Hence cool Air and Snow upon the Tops of Mountains.

The Hemiſphere of each Globe next the Sun, whither thoſe of Light iſſue, and where the Maſſes of Æther behind the Globe are hindered from pervading, is filled with Light, and the Action thereof divides thoſe Maſſes it found there. By this all Fluids are kept ſo; all vegetable Matter divided, and united with the Æther, and ſqueezed upwards.

When the Rays from the Sun ſtrike perpendicular againſt the Ground, a Wall, or *&c.* the Parts of the Æther act in the Surface or in the Pores, and are divided ſmalleſt there, and then thoſe which are at ſome Diſtance and groſſer, preſs in and puſh the ſmaller out, and are divided in Degrees as at the Sun.

If the Fermentation or Motion given by the Sun to the Fluid be reflected or turned back in the ſame Line it came, its Force is almoſt doubled; but otherwiſe if it had gone off in another Line; the ſame where Lines croſs or interſect one another.

Conſider the Angles of Incidence and Reflection of the Pillars of Light which ſtrike and go off from the Surface of the outer Globe, and how they cut and interſect one another, and form that Cap of Light which covers the Side of each Globe next the Sun, and likewiſe how they ſtrike and go off from the Surface of the inner Globe, and the inner Surface of the Shells where they miſs that Globe and paſs thro' the Sphere of Water, or how thoſe which reflected from the inner Surface of the

Shell upon the Surface of the inner Globe, are thence reflected outward through the Shell, and how and which of them affect the Variation and Dipping of the Needle upon the outer Surface: Will a Needle point to a *Vacuum?*

The Direction of the Motion of Light from the Sun, or Moon, is directed outward by the Atmoſphere, and ſo greater in the Even and Morn.

Theſe Motions of the Light and Dark, or ſmall and great Maſſes of the Æther, make the ſudden Alterations at Morning and Evening and the Grey Appearances; and perhaps Winds from Sea and Land to the Iſlands ſettle all theſe Things.

I am not ſure, but I think more light Particles than thoſe which come in a Line from the Sun to a Globe, will fly thither, becauſe as the heavy ones cannot paſs the Globe, there is a Sort of Space made thinner and ready to receive them, and ſo long as the Thinneſs near the Sun is greater than that near the Globe, the heavieſt will puſh thither. (*Query*, if Nearneſs may not prevail and make the large ones puſh in ſooner to the Cap.) But can there not be a middle Motion formed between two ſuch thin Places on the Surface of the Sun and a Globe, or two

Globes? Perhaps there may when the Thinneſs is near equal, but not between a Globe and the Sun (except as aforeſaid).

It is the reflected or rebounded Corpuſcles which heat us ſo much more when the Sun is near our Zenith, or a Plane at right Lines to the Rays behind us.

The Reflecting of Light from the Side of a Priſm, ſtrikes them into the Air, or Light in Motion in another Direction, whereby you have two or more Actions of the Light ſtriking upon, or further reflected to your Eye at the ſame Time, which is not ſhewing Light, but the Imperfection, if one may ſo call them, which not in Nature, but by our Means, happen between ſuch different Motions, and the Repreſentations they make, or the Ideas they raiſe in the Brain, are ſo contrived as to be gay, amuſing, and agreeable to ſuch as could be content to ſpend their Time about Butterflies. When Light ſtrikes a Priſm, it parts the Light and Maſſes of ſeveral Sizes in ſeveral Lines one from another.

When he does it in a dark Room, it is ſtriking Light into the Darkneſs, when in the Rainbow it is ſtriking Light againſt a Cloud, ſo upon a Bubble.

The Reflection of Light upon the inner Side of a Ring or round Veſſel, forms a Heart.

That they note for Blue or Black beyond the Globes is ſo craſs, that the Light does not thin it, and will interrupt any reflected Light in a great Meaſure.

When Window-ſhutters are opened, Light expands the Air, and drives it ſenſibly againſt the Body.

A Ray of Light will form a *Vacuum*, and the Rings about the Point will be of ſeveral Degrees of Groſſneſs, and Form divers Colours.

The Light which preſſes through a Hole moves quickeſt in the Center; and beſides the Reflections of the Sides, moves weaklier near the Rim, and cauſes Ideas of divers Colours.

The Æther is put into Motion in the *Bolonican* Stone, by putting it in the Light of the Sun or open Air when the Sun ſhines, and continues in Motion; in the Dark puts the Æther there into Motion, and ſtrikes our Eyes with a faint Appearance of Fire.

Motion is not eſſential to Matter, nor can Matter move further than the Force which impels it continues, and all Matter is moved either by a viſible or inviſible Agent.

This Fluid becomes a ſtop to the Motion given it by the Sun on every Side at that infinite Diſtance where the Force can move it no further; not at once, as it is ſtopt by a Solid, but by Degrees, till the Motion become imperceptible, as Water doth from that which moves it on every Side in a horizontal Plane, or the Motion of the ſame Fluid from other Planes oppoſite.

Its Motion from the Sun is alſo ſtopt by ſolid Bodies by the Sides of the Globes next the Sun from coming to us, moſt evidently, when a Globe interferes, and cauſes what we call a total Eclipſe in leſſer Degree, by denſe Vapours or Clouds in a Line between us and the Sun, or by the great Length of the Atmoſphere, when the Sun is in or near a Line with our Horizon, in Proportion to the Quantity of Steam in that Part of the Atmoſphere. For when the Steam in the Atmoſphere or Clouds is too groſs to be put into Fermentation, they interrupt the Motion in that Line, and ſo hinder the Light and Heat; or when the Steam riſes out of the Earth, and meets the Fluid in Motion, it partly diverts the Courſe, and partly condenſes or clogs the Fluid.

The Motion of the Air which we call Wind, in ſome Meaſure abates the Heat, but not the Light; the Rain in falling hinders both.

Though this Motion from the Sun can ferment this Fluid from that State we call Cold, or the humid Vapours which riſe from the Sea, or out of the Earth, yet it cannot ferment the Corpuſcles of terreſtrial Matter which comes in an Eaſterly or other Wind over a vaſt Continent of Land, which makes them more pernicious to Fermentation, Vegetation, and the Functions of Life than Cold.

The Courſe of this Motion is alſo interrupted or abated here by moſt Solids, except thin Glaſs, by the Walls and Covers of Houſes, by the Covers of Vaults, *&c.* in Degree, according to the Proportion of their Thickneſs, Solidity, *&c.* when any ſolid opake Body interpoſes between the Sun and us, the Motion in that Line is abated or interrupted, and we have little Heat, and no Light, but what comes by Reflection in Lines from other Bodies, or from the great Circumference where its Motion terminates.

If a ſolid opake Body interpoſe between the Sun and all Reflections, and incloſe us, that Motion we call Light, which comes in ſtraight Lines, in a Moment ceaſes, for the laſt are moved by the firſt like Links in a Chain, or rather like a Row of Bullets in a Barrel. But the Corpuſcles of that Fluid put into that Motion, we call Heat, as they can pervade the Pores of Matter in any Direction, if the Body interpoſing be not very thick or ſolid, will pervade and act, and if they be totally interrupted, ceaſe not to act ſo ſuddenly as thoſe of Light.

When the Clouds, Rain, *&c.* keep off the Ferment of the Sun, and chill that Part of the Atmoſphere like an Eclipſe, the Reſiſtance being leſſened, it ſuffers the Steam to riſe out of the Earth. The nearer the Sun, the Ferment is interrupted as in an Eclipſe by the Moon, the more its Operations here are weakened, and that Stop for a few Minutes chills every Thing here, more than the Interpoſition of the Earth for a Night.

I think the Sides of the Globe oppoſite to the Sun, receive nothing from it, nor ſend nothing to it; for if a Space be near full of a Fluid, puſhing the Fluid in one Part, muſt move Part of the Fluid to the oppoſite Side in ſtraight Lines, and it muſt rebound from the Plane it ſtrikes, or at leaſt it will be moved a Diſtance, in Proportion to the Strength applied by the Agent, and the Fluidity of the Fluid; and if one Corpuſcle or ſmall Part be puſhed forwards, it puſhes another backwards, or into the Place of that which moved firſt in any Direction, ſo this violent Agitation can never empty the Space about the Sun, nor leſſen the Quantity of the Fluid there; nay, if you allow the Fluid to fill the Space, let the Sun move the Corpuſcles there, with never ſo great Force, and throw them to never ſo great Diſtance, the Caſe will be the ſame; for the Force that throws them forward, throws others backward; and whatever Diſtance they move at once, the Sun will always be ſupplied with freſh Fluid.

If the Sun be only a *Focus*, its Motion each Way will be equal, except the Reflection of the Globes alter it: If our Poles were not frozen, they would admit more of this Fluid, and perhaps their little Motion, as well as the want of the direct Motion of this Fluid from the Sun, helps to freeze them.

That Part of this Fluid near the Sun, which is put into a violent Ferment, is Fire; that which is at a greater Diſtance, and leſs moved, Heat; further Warmth, further Light, and where the Ferment is weakened by Diſtance, or interrupted by Matter interpoſing or intermixt, faint Light; Darkneſs and Cold, where it's clogged, or wholly inactive Froſt.

And it is likely the Agitation weakens where it is pure, in Proportion to the Diſtance of the Lines from each other, extended from the Center of the Sun, or from its Surface, in a certain Proportion to the Diſtance and Interruption; and this Fluid differently moved, or at Reſt, communicates ſeveral of its Qualities, and may be compared to Water or other Fluids, boiling, warm, cold, frozen, *&c.*

The Corpuſcles of this Fluid are moved by the Sun in right Lines from its Center, or rather in Angles between Lines extended from the Center on each Side into the immenſe Space.

Its Force is ſtrong enough here to rebound at ſeveral Times; ſo this Fluid will form Circles every Way about the Sun, or any other Agent which puts it into Motion, thinneſt or brighteſt, or moſt agitated at its Sides, and ſtill thicker, darker, or leſs agitated, as it proceeds to greater Diſtance.

Though the chief Courſe of this Fluid is ſtraight forward from the Sun, yet it has a weak Courſe Sideways; for when as we ſay Light paſſes through a Hole into a dark Room, the Stream grows broader and broader from the Hole; the Stream in a Line from the Sun bright; the Sides of variegated Colours.

If the Sides of the Hole be thin, the Reflections or Motions of the Fluid from the ſeveral Sides of the Hemiſphere may make ſome Alterations: But if the Sides of the Hole, or the dark Body through which the Light enters be thick, the Reflections can have little Effect; but the Colours in the Sides of the Stream muſt be changed by the ſideways Motion of the Corpuſcles, and the different Degrees of Fermentation or Motion, or the different Directions of the Corpuſcles muſt form or repreſent different Colours.

The Agitation of this Fluid in Form of Light, ſo entring into a dark Room, is viſible by the Motion it gives the light Bodies we call Sun-Beams, and by its Rebounds upon the Ground in a hot Summer's Day, and I think may be ſeen in a pure Glaſs Receiver, where the Air is extracted.

Every Idea of Matter ariſes from a Repreſentation of ſome one, or ſeveral of our Senſes, or what by Diviſion or Compoſition on has Relation to thoſe which have been repreſented by the Senſes.

The Idea we have of any Parcel of Matter being moved by Agents without, will be imperfect till we know the Agent that moves the firſt Parcel of Matter, which contributes towards the moving of the ſeveral Parcels of Matter between, and thoſe Parcels of Matter and the Body moved, and the ſeveral Parcels of Matter removed to make Way or Paſſage for it, and the ſeveral Lines, the ſeveral Parcels moved, deſcribe to take their old or new Places. This only relates to viſible Solids, for the Parts of uniform Fluids eſcape our Ideas, and we have no other Idea of them than of Spirits.

The Idea we have of a Parcel of Matter being moved by Agents without, and Parts contributing to the Motion of the Whole, or Parts, or Part within, will be imperfect till we know the Agent that moves the firſt Parcel of Matter, which contributes towards the moving of the ſeveral Parcels of Matter, between the Body moved, and thoſe Parcels of Matter between, and the Parcels of Matter contributing within, and the ſeveral Parcels of Matter removed to make Way, or, *&c.*

The Sun is the Eye of the World, and alſo the Furnace, by which all Things are prepared.

I think all other Fluids are inactive themſelves, and their Motion proceeds from the Motion of this Fluid, and this alſo is inactive till it be put into Motion by the Sun, or, *&c.*

If Matter have no inherent Inclination to Motion or Reſt, but as it is directed by the Motion of this Fluid, then the Weight or other Qualities which they attribute to the Globes, except their Degrees of Solidity, have no Exiſtence, and this Fluid may move them as eaſily as ſo many Feathers, or as it would move without them.

The Preſſure of this Æther ſeparates Matter, each into its Place of Uſe. Bodies moſt ſolid, or moſt united loweſt, and the ſeveral Degrees to their ſeveral Degrees of Diſtance from each Center; ſo that the heavieſt moves toward the Sun, and the lighteſt outwards.

The Motion of the Parts of Air is more violent, as they come nearer the Sun or Fire, and ſo break the Maſſes more in ſome Proportion to the ſtraitning of an Angle, as it comes nearer the Center, the ſame Quantity moving through the ſtraiteſt

eſt Part of the Angle, in the ſame Time as the greateſt Quantity moves through the wideſt Part; much in the ſame Manner as the Water which was preſſed from each Side, towards an Inlet into the Abyſs, which being conſequently with greater Velocity, if the Water be capable of forming into Maſſes, broke them and thin'd it more (which ſeems to be the Caſe in running Water, which keeps it from being corrupt, and of Water raiſed through Pores of Stone, Chalk, *&c.* in Springs which makes it finer, and perhaps ſomething lighter) and alſo tore the Stone with greater Force; and if it were of the ſame Reſiſtance, tore it deeper next the Inlet.

Nothing larger than Unites or Light could ſucceſſively impel and drive them out from the Sun hither; and if the Unites of the Sun be larger than the Unites of Light, not one of them can depart from it, and nothing larger could drive the Unites or ſmall Maſſes of the Æther into the Pores of Veſſels, Bodies, *&c.* with ſuch Force, but ſuch as themſelves behind.

Either there is Unites in the Æther of different Sizes, or elſe the groſſeſt Maſſes are puſhed moſt: But perhaps this holds only as to itſelf, and that the Unites or ſmall Parts of the Æther preſs as freely through between the Unites in the Maſſes of all other Sorts of Unites, as if they remained looſe in Unites.

Though it has been overlooked thus far, the Proof upon which the whole depends, to wit, The groſſer moving toward the Sun, and the ſmaller receding, admits of Ocular Demonſtration.

Proofs may be made upon the Motion of the Æther, by obſerving the ſmall Bodies we call Sun Beams in the Light, they being groſſer than the Maſſes of the Æther.

It ſhould be done in a ſtill Day, and no Fire, Holes, nor Draughts of Wind.

They all move in the Stream of Light towards the Window in a Line towards the Sun, and partly downwards, when the Sun is low, and I ſuppoſe, ſtick upon the Glaſs, or get out at ſmall Holes.

If there be any Fire in the Room, ſome go to the Fire, ſome towards the Sun, and ſome more obliquely; one may ſee how they move towards the Fire, with the ſame Light of the Sun.

When the Sun is near the *Zenith*, if there were a Hole in the Top of the Room, they would all go out there.

I ſuppoſe thoſe ſmall Bodies are raiſed off the Floor by the Re-action, try them off a Glaſs.

Are not Sun-Beams ſuch Matter as form Clouds, before they are raiſed out of the Atmoſphere, the Earth turns them into the Side of Darkneſs?

If ſuch ſmall Bodies were put into a Glaſs, and let looſe after the Air were extracted, one might ſee how they would fall in a clear Light.

Sun Beams fly one's Hand gently mov'd; try other Bodies.

When the Sun ceaſes to ſhine, or the Bodies paſs out of the Ray in a Chamber, they fall down.

The oppoſite Motion of the lighter Parts from the Sun, and the heavier towards it, doth nothing towards any Body, towards or from the Sun, their Force being near equal (except Sun Beams) but only the Compreſſure of the whole acts in every Direction, nearly equal by Rules, as aforeſaid.

Light from the Sun, a Candle, *&c.* is carried off in this Manner, and a continual Rotation is made in each Sphere of ſmall going off, and heavier coming to, and the heavy, as it comes to, growing ſmaller, and the ſmall, as it goes off, uniting and growing heavier.

Light is ſucceſſively propagated by ſome Action, which divides the Maſſes or Fluid of Æther at the Sun into ſmall Corpuſcles; 'tis driven, by an Acceſſion of heavier Maſſes, in right Lines from the Sun, by the Preſſure of the Atmoſphere; 'tis Day upon that Part of the Earth it ſtrikes againſt, and Darkneſs on the oppoſite Side.

The Light perhaps does not proceed, or put thoſe in Proceſſion into Motion, ſo great a Diſtance as they talk of at an Eclipſe; but the Earth is moved in a few Moments into another Space, where the Light is in Action, and perhaps the Pillar of Darkneſs may alſo move with the Body, *&c.*

The Recedence of the Light from the Sun, or, *&c.* will be diverted, when it ſtrikes ſloping upon Maſſes of Air, which are groſſer than thoſe proceeding, and that is the Reaſon why they pervade the Pores of Glaſs, *&c.* which are exceeding ſmall, and adhering cloſe, which they cannot do thro' a Body, which has large Maſſes or Intervals. The Sphere of Light, or rather Cap, next the Sun, turns with the Atmoſphere ſucceſſive to behind the Globe, whence Motion of the Globe.

No Force could make Light reflect if all were not full; if any Thing moved one Way, and another Part did not return, it would move what ſtood in the Way.

If the Action of Fire be ſupported by the Diviſion of Fuel, and that Fuel can re-unite and fall down again, that is perpetual Motion.

The Difference between the Sizes of the Unites of Æther, and thoſe of Water, is ſo great, that wherever the Æther is in Motion, and the Maſſes divided to a common Degree of Smallneſs, they keep the Unites of Water diſunited; but they muſt be much ſmaller divided, or in Unites, when they can pervade between the Unites which compoſe their own Maſſes, ſo as to reduce them to Unites, and in conſiderable Motion; whence they do not preſently re-unite into Maſſes.

In the Morning in Summer, or when a Window is newly opened, the Sun Beams move freelier to it.

The Force of Motion is bounded, if there be any Æther which the Sun does not move.

Perhaps the Stars which are fixed, are ſo for returning the back Light, and therewith preventing a Stagnation of the groſſer Æther, and making the larger Maſſes return to the Sun; and perhaps ſeen and unſeen, there may be as many of them as environ the immenſe Circle, and moſt near the Equator or Ecliptick.

FIRE.

THIS Fluid ſufficiently agitated by the Sun by Accident or Art, can divide the Corpuſcles of almoſt any Body, without impelling or puſhing the Body forward, but does not impel or drive any ſolid Body here without the Aſſiſtance of Air or Smoke, Water or ſome groſſer Fluid; can by the different Degrees of Agitation and Quantity of its Corpuſcles in the Pores of Bodies of different Conſiſtences divide the Corpuſcles, and by the Aſſiſtances aforeſaid, being ſufficiently injected into and agitated in the Cavity of any Veſſel, or *&c.* burſt it; when in that Degree of Agitation we call Fire, it divides the Corpuſcles of Bodies, or reduces them to near their firſt conſtituent Parts, and ſome ſink, ſome ſwim, *&c.* but diminiſhes nothing.

Thus Salts in Maſs are inactive, when divided into ſmall Maſſes, fret the Coats of the Skin or Surfaces; when divided into the ſmalleſt, freed from extraneous Matter and agitated, act like Fire, which when greatly agitated enter in at the Pores and begin the firſt Actions by fermenting the Fluids, and dividing the Corpuſcles of the Solids, *&c.* But when a ſufficient Quantity is put into Motion or Ferment, if it cannot pervade in a Moment, it burſts or diſſolves the ſtrongeſt or moſt ſolid Body.

The Spirit or Grains of Atoms driven by the Impulſe of the Preſſure againſt the Atoms in the Action of Fire, are ſplit and divided by thoſe Atoms, as if they were driven againſt ſo many Spikes or Points ſo ſmall as to enter between their Atoms on every Side of the Fire; and when one Grain has loſt ſeveral of its Atoms, ſo that another takes Place of it, it is toſſed back, and many ſuch make the Buſtle we call Flame: So none can enter till they by ſeveral Strokes and Repulſes are divided to Atoms, and make an Addition or Supply to the Parts of the Fire, nor go off till they are ſucceſſively driven out in Atoms or Light.

The Corpuſcles of this Fluid by different Degrees of Agitation, in Proportion to the Degrees of Adheſion, divide the Corpuſcles of all Matter, Fluid, or Solid; if they be of different Gravities, ſo that ſome will ſwim in Air, and ſome ſubſide, ſeparate them; if they be of equal Gravity, and too heavy to ſwim in Air, calcine them, or keep them in Fuſion during the Agitation.

Muſt not thoſe Points which are driven with a Force ſufficient to divide and ſplit the Atoms of a Diamond from each other, be as hard as the Atoms of a Diamond, or that Compreſſure which makes them adhere be taken off or broke? In Fire, where the Spirit is melted as it comes in, and the Vibration of Light in the Motion we call Fire is ſo quick in every Direction, and tends to no Point, the Preſſure of the Spirit is leſſened or taken off: The Direction of the Puſhes of the Light is ſo varied, that inſtead of preſerving the Adheſion, it partly ſuffers and partly forwards the Diſſolution of the Atoms of moſt Sorts of Bodies, keeps ſome of them fluid, in Motion, *&c.* nay, a ſufficient Degree reduces any to Atoms, and upon removing them out of the Fire, the Spirit gives them their uſual Degree of Adheſion.

If the common expulſive Force of this Fluid be the Cauſe of Adheſion and Gravity, where that Force is increaſed in a Part of the Fluid, it can by its Aſſiſtants or Inſtruments, Air, &c. throw a Body with Force and Velocity equal to the Difference between the common and increaſed Force, or burſt Bodies, or ſplit Maſſes of Corpuſcles which the common Force keeps together. Fire, in Gunpowder, works with the Corpuſcles of Matter in Form of Smoke, and thereby expels Bodies with that incredible Force, and the Smoke is ſo groſs that it makes a Percuſſion in the Air.

Fire obſtructed by or expanding Water has a prodigious Force, and can with a few Grains of it throw off a great Quantity of melted Metal, with a Force perhaps not inferior to Gunpowder. What Force it hath with pure dry Air, I am not certain.

A ſmall Quantity of Water poured upon burning Fuel, as Coals, or &c. expands and burſts the Fuel by the Impulſe of the Corpuſcles of Fire, and renders the Fuel more open, makes more Surfaces, and thence more fit for the Fire to act in.

If the Pores of Fuel be full of Corpuſcles of Water, the Corpuſcles of Fire muſt expel them, each by detaching and bearing off ſome in their Pervaſion, before they can act in Form of Fire.

The Corpuſcles of this Fluid in paſſing through a Burning-Glaſs, are not only freed from Air, but put into a Fermentation in ſome Meaſure as they are in paſſing through Fuel. And however they be agitated in our Atmoſphere, except directly from the Sun, cannot act in that Degree we call Fire, but in the Pores of fluid or ſolid Matter, where the intervening Corpuſcles keep off the preſſing Fluid which is not agitated enough to act.

When Fire in Action is incloſed within a Furnace, or *&c.* it rarifies, expands, and expels the Air upward, and the Force of the Stream of Air into ſuch a *Vacuum*, is increaſed by the Straitneſs of the Entrance, as a Spout out of a Veſſel of Water. The ſtronger and quicker the Air moves in, the more it agitates the Fire. If the Entrance for the Air in, and the Paſſage out be too long and too ſtrait, the Fire will rarify to that Degree as to burſt the Furnace. If the Air be admitted in too faſt, that is, faſter than the Corpuſcles in Action can inflame or agitate thoſe in the Air, it at once clogs and hinders their Action, and the Velocity of Motion in the Pillar. If the Entrance into the Furnace below the Fire be quite ſhut, and the Paſſage upward open, it will act very ſlowly. Where Fire has ſufficient Quantity of proper Fuel in Action, and is once arrived to a conſiderable Height, it ſufficiently agitates and prepares the adjoining Fluid, and without any Help by Art increaſes infinitely.

The Fluid agitated by the Sun ſtrongly weakens the Force of Fire, becauſe it either expells the Air too much, or is too much divided, and pervades the Pores without dividing the Corpuſcles.

The Action or Motion of Corpuſcles from the Sun, are in Lines nearly towards the Center of this Globe, or a little obliquely; thoſe from Fire or Fuel, in a Line from the Center of the Globe towards the Sun, unleſs forced aſide by Reſiſtance; and in the ſame Lines in which they move themſelves, they move other Bodies; by this Means one of them oppoſes the other, as the Sun-ſhine Fire in Fuel.

This Fluid fermented by the Sun to a ſufficient Degree, has all the Qualities as Fire acting in Fuel, only it is freer from extraneous Matter, and is thereby more ſubtile. It is likely when there is any ſudden *Vacuum* made among the Clouds by Condenſation, or *&c.* this ſubtile Fluid ruſhes in firſt, and by its Motion is agitated to the Degree of Fire, and fires the reſt of the Fluid in the Direction it moves.

When the Fluid is fired in that Manner we call Lightening, either the Air is expelled from one Cloud to another, or the fired Fluid by meeting the humid Clouds in its Courſe by entring expands the Humidity, and is thereby expelled from one Cloud to another, and makes that Percuſſion of the Fluid which we call Thunder, which reaches our Ears in a ſmall Time after the firſt Flaſh.

The Rays or Streams of Light or Fire which reach hither, and have ſuch forcible Effects, make little or no Percuſſion in the Air. As the Weakneſs of the Preſſure, or of the Reſiſtance of the Air and Fluids, is the Cauſe of Extenſion and Pain in weak Parts, which frequently precede Storms of Wind and Rain, ſo the ſame Cauſes give Opportunity to the Air and

Fluid in Parts adjoining, which are more preſſed, more full, or larger Maſſes, to puſh that Way where it meets with leaſt Reſiſtance. Even Clouds interpoſing between the Sun and any Part, may abate the Expanſion in that Part, and ſuffer the Rain to fall, or the Wind to blow thither from the Places where the expanding Force is greater.

This Fluid muſt pervade the Earth, raiſe Vapours, &c. The Corpuſcles of this Fluid intermixed with others ariſing out of the Globe on the Side which is turned from the Sun, wholly or obliquely remain entangled with Corpuſcles of other Fluids or Bodies, and are clogged till that Side be inverted to the Sun, and then they are divided, ſeparated, agitated and thinned, and ſo alternately.

Part of this Fluid may be put into that State which we call Fire, by Friction of Solids, by collecting the Corpuſcles with Glaſſes, &c. and by preſerving that Fluid ſo collected and put into Agitation by proper Fuel: To make Fire act here, there muſt be ſo many Corpuſcles in proper Pores of Matter put into ſuch Motion that the Preſſure of Air, and the reſt of the Fluid, ſhall drive them forward, but not ſeparate them.

This Fluid, when by any Means any Part of it is put into Motion amongſt the Pores of proper Bodies, keeps itſelf in Motion. When Corpuſcles of this Fluid are in Motion in the Pores of Fuel in the open Air, the Corpuſcles of the next adjoining below or ſideways, drive in, and drive the others out upwards in immenſe Quantity, and with prodigious Velocity, as may be ſeen by the Shade of the Smoke iſſuing from a Candle burning in the Sunſhine, beſides what is thrown out ſideways; and every Atom of the Smoke is compoſed of the Corpuſcles of the Fluid, and of the Fuel that goes upwards, and thoſe which go ſideways are inviſible, becauſe they are light. When in a Furnace, or any thing which confines them, beſides the new ones, the ſame Corpuſcles which have paſſed the Pores are rebounded by the Sides of the Furnace, or *&c.* and paſs the Fuel through and through, before it go off upwards; in like manner where there are great Quantities of Fuel or Fire, though the Fluid can enter, yet if the Smoke or Steam go not off, there will be no Continuation of the Ferment, as Fire will not burn in *Vacuo*, nor Veſſels ferment much when corked cloſe or hermetically ſealed; and it is very likely it is this new

Admiſſion of the Corpuſcles of Fire, which keeps up the Fermentation ſo long in Fluids. And this Agent muſt agitate Salts in Diſſolution of Metals, (whether if the Glaſs be ſealed I know not) Ebullitions in Mixtures of Salts, and ſome Sorts of Fluids, Exploſions in Gunpowder, *&c.*

Whether the Corpuſcles of this Fluid act the Part of what we call Fire alone, or whether they act with the volatile Salts which fly in them, or with thoſe it melts in the Fuel, or with both, is hard to determine.

The Pores of Fuel muſt be of that Size, and the Corpuſcles of that Figure or Adheſion, that the Corpuſcles of this Fluid may, but the Maſſes or thoſe of Air may not enter, and that the Corpuſcles of this Fluid may divide them, and ſeparate ſome of them. If there be any of Water, they expand, burſt and drive away the Corpuſcles of Fire.

As the Fire increaſes in Force, it divides and prepares more of the Fluid about it, or puts more of it into that State we call Fire; and if there be Fuel or Matter ſufficient to act in, it will extend infinitely.

The Force of being near the firſt Action prevails againſt the Force of the Fluid moved by the Sun, becauſe it is diminiſhed by the Diſtance from the firſt Action.

Fire burns beſt in the Night, cold Weather, or Froſt, partly becauſe the adjacent Maſſes of the Air, *&c.* are then moſt united and liable to be driven down, and conſequently to drive the Corpuſcles of the Fire and Smoak divided by Agitation upwards, and partly becauſe the Maſſes of the Fluid are not divided too ſmall before they come to Action: For the Expanſion of the Fluid by the Motion of the Sun, whereby the Gravity is as great, and the Fluid more divided, partly by its oppoſite Motion, and partly by its rendering the Fluid too thin, weakens the Fire, and conſequently when and where Fire is moſt needed, it acts ſtronglieſt: So this Fluid in Form of Light or Heat iſſued out from the Sun, weakens the Force of Fire acting in Fuel; in Form of Darkneſs, and eſpecially Cold, ſtrengthens it.

There are two Operations of this Fluid which affect Fire, the one the Preſſure which carries the Corpuſcles of Fire upward, impels new Corpuſcles in, and makes the Motion ſtrong. The other Expanſion which when it ſtrikes upon a ſmall Fire directly and ſtrongly from the

Sun, it hinders the Motion upward, and weakens the Fire.

When two hard Bodies are ſtruck or rubbed one againſt another with great Force and quick Motion, they puſh the intermediate Corpuſcles of Fire violently through the Pores of the Surfaces, put them into that Action, by which they divide the Corpuſcles of Bodies, they being once put into that Motion, others ſucceed them by the Preſſure behind, and if they meet with proper Fuel, begin to act and extend in Proportion to the Fitneſs and Quantity of the Fuel, ſo that the ſame Action, as Shaking, Friction, *&c.* which moves the Fluid and touches the Ear, continued, occaſions Heat, Fire, Light, *&c.* And a Tube with a wide Mouth and a ſmall Aperture applied to the Ear, and the wide Mouth at the other End collects and conveys this Fluid to the Ear, and ſtrikes the Part which gives the Senſe of Hearing more ſtrongly.

When a Sphere about the Sun is thinned, it goes off equally every way till Globes interrupt, and the groſſer Maſſes preſs in equally; and where there is a Sphere of thinned Matter by Fire near the Earth, it takes the ſame Courſe in all Directions, except downwards, if at Liberty, and groſſer Matter from all Sides puſhes in. But when it is confined on all Sides, preſſed by the groſſer, and included ſo that the light Matter makes its Way at one Point, the Force of Expanſion, or more truly of the Pulſion, on every Side is vented there.

The groſſer Parts of the Air are ſtill preſſed to the Earth, between it and the Fire at any Diſtance from the Earth, and thoſe divided into the Fire cannot retreat that Way.

In ſmall Fires here, the Fire acts upon the Æther, by being ſheltered in the Interſtices of the Fuel from too great a Quantity of Air, which would preſs in upon it, and extinguiſh its Motion given, and only divides the Corpuſcles of what we call the Fuel by that Operation accidentally: But when in ſufficient Motion, it flames out to a proportionable Diſtance, and Fire injected into Bodies which that Force is not able to divide, continues its Action ſome Time.

The Spark of Fire in a Chip of Metal, acts for a Moment in its Pores as above.

Does the ſmall Æther pervade through the Pores of the Fuel to ſupply the Action?

Does not the Æther which pervades the Earth, raiſe to the Fire and bring up the Water out of the Surface to the Fire? Or is it any more than the loweſt and groſſeſt Æther at the Surface being preſſed in, which raiſes the Water to Fire, and in hot Weather?

Where there is no Wind, the loweſt and largeſt Maſſes of Air, and not thoſe from above, are puſhed into the *Vacuums* which the Fire makes, and by that means the Parts of Light and Heat recede, and are diffuſed upon the Surface and made uſeful, while the Maſſes of Smoke, and part of the vegetable Matter which goes off from the Flame, and which are much larger than thoſe of Light, and the Maſſes of Air which are not ſplit ſo ſmall as thoſe of Light, ſome by their being divided ſmaller than thoſe in the Air next above the Fire, riſe till they come to Maſſes of the ſame Size, and ſome, by the larger Parts of Air puſhing into the *Vacuums* made behind or below them, are puſhed upwards, and riſe till the Force of that Part be ſpent, and then fall.

The groſſeſt Parts of Æther enter on the Side of the Body where the Fire begins, and ſome ſmaller, enter from the oppoſite Sides, I think, in Proportion as the divided Parts recede.

There is a proper certain Quantity of Air ſufficient to make Fuel with Fire work, if leſs it will go out or burn ſlowly, if a proper Quantity it will burn very faſt, if more it will burn ſtill ſlower, and the Motion of the Air coming towards that in Action is, in Decreaſe from the proper Quantity, ſlower, when there is too little, and when there is too much.

When the Air has free Acceſs to the Fire, in a ſmall Quantity of Fuel on every Side, the Fire burns ſlowly, and the Spaces between the Fuel are ſucceſſively filled with Flame or groſs Air: But when the Fuel is included in a Place, ſo that a certain Quantity of Air can be admitted, no more than the Fire can divide, the Space in which the Fuel and Fire is contained becomes a thin *Vacuum*, and the Air without is puſhed in with greater Violence: If leſs Air than the Fire can divide comes in, the *Vacuum* is ſtill thinner, and the Air puſhes in with greater Force, and ſo on.

Raiſing the Parts of Oil or Spirits into Motion is but the loweſt Degree of Fire, is but that Degree we call Flame, that the Parts hover, and will neither ſtay nor go off.

Will Wood burn in Spirits or Oil, when they are burning? Wick of Flax doth not.

Where the Parts of the Fuel are fluid, they are more eaſily driven up into the *Vacuum* which the Fire forms by receding upwards to form the Appearance we call Flame, than when the Parts of the Fuel are ſolid, and ſo in Proportion.

Oil in ſmall Quantities preſſed into Fire, mixes with the Fire, and riſes in Flame and forms a Fluid of near the ſame Groſſneſs as Air, and the Fire ſubſiſts in Flame, and the Parts of Oil being perhaps the lighteſt of any Fluid except Spirits, it and they are toſſed in Form of Flame.

Would not Time in burning the ſame Quantity of Spirits of different Proof be different, and that a Proof of the Fineneſs of each?

Perhaps the Pureneſs of Oil may be proved the ſame Way.

Perhaps they may burn faſter or ſlower in different Seaſons, but that may be proved by trying proof Liquors at the ſame Time.

Officers may now do as they pleaſe, there is no certain Evidence, what any is above Proof.

Within the Sphere where the Fire acts, the Parts of Æther on the outſide of a Body are as ſmall as thoſe within.

Will a burning Candle draw thoſe Maſſes of Air down, &c. we call Sun-Beams to it? Is that Rarefaction greater than that of the Sun, where it comes through a Window into a Room?

The Compreſſure of the Air above, makes the Corpuſcles thinned by a Fire, Candle, &c. here, diffuſe ſideways as well as upward. Add that thoſe ſmall Bodies which are divided by a Candle move other ſmall Bodies which are amongſt the larger Maſſes to a vaſt Diſtance on every Side.

Perhaps that which in Mines will not let the Candles burn, nor us breathe, is not Air, or there is not ſufficient Quantity of Air, or that Matter enters the Candle, or, &c. and hinders, ſo we perſpire more. Perhaps the Maſſes are too groſs, and cannot enter; or Water in them, and that intangles the Corpuſcles of Fire.

Light will not extend from a Candle, in a Grotto, or Vault, or in Mines, &c. where the Æther is formed into groſs Maſſes, and few ſmall ones remain among them, near ſo far as it will in the Night, where there are many ſmall ones that have been divided the Day before, nor ſo much near the Morning.

Where they are all groſs Parts, and no Parts of the Æther ſmall enough to enter the Pores of the Fuel, a Candle will not burn; would a Lamp with Oil, or ſome more open Fuel?

Cultivate that, that Light will but ſtrike a little Way in Mines, or Places where there is not, or has not been lately a Mixture of Unites.

While the Spirit preſſes equally upon the Flame of a Candle, the Atoms of the Flame are ſo near together, and ſo ſmall, that they admit not a Grain till it be melted, and iſſued upwards or outwards in Light; when the Spirit is driven in on one Side more than the reſt to a certain Degree, it diſſipates the Parts of the Flame, and extinguiſhes the Fire, except it be reſiſted or rebounded, as the Spirit doth in a ſmall Degree, and a Solid in a greater.

A Furnace reverberatory, kept cloſe, and over-heated, would be burſt by the Air, and after it were burſt, the Air would blow away the Sides; and if a Ball were placed in a Tube at one End which could come outward, but not go inward, and when it were very hot, the Air were let in at the oppoſite End, it would drive the Ball; and ſo would the Air let into a heated Barrel at the Touch-hole.

In a reverberatory Furnace, the freſh Air comes in only along the Draught, and is kept off on all other Sides and the Heat reflected, which makes it ſo active there, and the cold Air is kept out of the Æther in the Flue, which makes it lighter and riſe with greater Velocity, as the Difference between it and the outward Air is increaſed: Hence Fire burns beſt in cold Weather, Night, *&c.* and worſt in Sunſhine, where the Æther is thin. But Smoke may be expelled up the Cupulo or Flue, by being groſſer than the Air is without.

As the different Sizes of ſmall Bodies are neceſſary to divide the Parts of Solids, ſo the Parts of Æther in a very violent Fire, may be too ſmall to divide ſome Solids, which a weaker with larger Maſſes may.

Fire cannot divide a Body into ſmaller Parts, than thoſe whereof itſelf is compounded, unleſs by Strokes it make the Body fall aſunder.

Vibration in the Fire proceeds from the Corpuſcles of Fire paſſing between the Corpuſcles of Metals, *&c.* or between the

Ends of them, and the Spirit beating their Planes or Ends together again.

Fire burns almoſt as badly in the hot Sun-ſhine, as in *Vacuo*, becauſe the Parts of the Æther are ſo ſmall, they make no great Motion by their Difference, nor no Work for the Fire to divide them.

A Chaffing-Diſh filled with burning Coals, and placed between the *Focus* and the Glaſs in ſuch a Manner, that the reflected Rays are obliged to paſs through the Evaporations of thoſe glowing Coals, the Action of the ſaid Glaſs was notably weakened thereby.

When the Recedence of the Æther, from the Fire upwards, moves with a Force ſufficient to overcome the Difference, which the Preſſure above exceeds that from below, upon the Unites of a Fluid, or thoſe in Fluidity above it, they move, boil, riſe, or, *&c.* in Proportion to that Exceſs.

If there be any Unites of Water, in the Fuel, for Example, in a Stick of Wood, and it be kindled at one End, while the Fire acts weakly, the Unites of Water are puſhed along the Pores into the Fire: But when the Action of the Fire is increaſed to a certain Degree, the ſmall Parts retire in the Pores from the Fire ſo ſtrongly, that they drive the Unites of Water the oppoſite Way. I have ſeen it drive horizontally; will it drive upward and downward? I think only horizontally, or upward, and not downward. But that the groſs Maſſes of Æther raiſe the Parts of the Water into the Fire, and the ſmall Parts of Æther force them upward, or to recede horizontally.

Water being of greater Gravity than Fire, the Water being thrown upon the Fire, preſſes into its Place, and puſhes out the Fire upwards and ſideways; perhaps the Maſſes muſt not be too far unequal, and that too groſs Maſſes of Air will not aſſiſt Fire, when they will not enter the Pores; and Water being mixed with Fire, and raiſed into Vapour lighter than the Air, the Air puſhes in, and drives up the Vapour: So Æther preſſed into the Fire without Air, will not make it burn or blow up with any Force, till a Smoke ariſe.

The Parts of any Thing which are groſſer than the Parts of Flame, and will not be divided in it, extinguiſh it.

The Vapours muſt aſcend from the Earth, becauſe the Fire recedes that Way, if not obſtructed by Clouds. Then ſomething muſt go down, when the *Aurora Borealis* riſeth upwards.

Where, in a Blaſt, the Force is from a Center outward, as in Fire or Exploſion, it drives the ſolideſt and groſſeſt Part foremoſt, as a Bubble of Phlegm is formed in the Fire; where the Force is inward towards a Center, it drives the groſſeſt or ſolideſt Parts foremoſt towards that Center; ſo the Force outward drives the groſſeſt, and the Force inward doth the ſame, which forms a Bubble of Phlegm in the Fire, the Cruſt of the Earth, *&c.*

In Fire-Damps, if there be any Atoms of Sulphur, or, *&c.* heavier, or but as heavy as thoſe of Air, they immediately fly to the Candle or Fire, and take Fire, and as they increaſe the Fire more, fly in by the ſame Law, till it in Atoms be reduced to ſmaller Parts than thoſe without, and then they fly in from all the Caverns, and blow the Fire, *&c.* out at the Mouth of the Pit.

The Corpuſcles of Fire, and the Æther, cannot remove or blow up Solids, even where it is environed, till it has an Atmoſphere of Air or Smoke to ſtop the Pores; hence Lightning that has no Smoke, pervades more, and blows leſs than Gunpowder.

The Sparks of Fire in Charcoal fly by *Vacuums* being made behind, and groſſer

Parts of Air puſhing in, and puſhing them out.

Flores Sulphuris, in fine Powder, thrown up in the Air at a little Diſtance from the Fire in the Draught, will go to the Fire and appear there, and the Smell of it, when ſmall divided in the Fire, will recede to the Place it was thrown up in.

The Salts in the Sulphureous Bodies, Marchaſites, &c. divide the Oil by the Help of the Air, and riſe, and ſmell, and ſwim in the Air.

The Stays which melt in *Volcanoes* will ſtop the Water from aſcending through the Cracks, and the Air muſt come ſideways, which makes it burn; when Water gets in, perhaps that makes it fly.

The heavieſt melted Metals or Fluids, preſs out Fire with greateſt Force, and burn moſt.

Whether the Corpuſcles of the Æther or of Fire be attracted or kept in Bodies that are hot? I think thoſe that attract moſt, keep hot longeſt, and the Æther pervades ſloweſt, and is longeſt in removing them, or the Action of Heat is continued longeſt by the Straitneſs of their Pores. Where the Pores of a Body or Fluid are very ſmall, and ſmall Maſſes of the Æther are put into Action in them, and thoſe Pores will not admit any groſſer or very little groſſer to puſh them out, they are kept long in Action by ſucceeding ſmall ones, or long kept hot.

There is alſo ſome ſuch Diſpoſition to be attracted in Fluid melted, as in Iron, which forms it into Globes or Spheres, or ſome Figures which let Light pervade them; but they cannot be ſeen for that Reaſon.

I could anſwer a great many wiſe Queries, if I am right, as red hot Iron is Iron, and the Fire in it is Fire; but this is enough.

FINIS.

BRITISH 29 AP 92 MUSEUM

Pray Point and Read the following Places as below.

PAGE 3. *line* 24. Moderns thoſe who framed them ; ſo
p. 8. *l.* 3. moved, the Parts
p. 43. *l.* 29. *ſegilli, &*
p. 52. *l.* 27. Part ;
p. 60. *l.* 8. Spirit, and the Pores would
p. 73. *l.* 3. proved thus alone,
p. ibid. l. 26. do the other in this ;
p. 74. *l.* 18. This Mixture is the Agent, in it is the Life,
p. 75. *l.* 7. Light which pervaded alone : As
p. ibid. l. 9. out, it
p. 77. *l.* 26. ſeparated, all
p. 80. *l.* 1. cover and ſtop,
p. 103. *l.* 8. *for* a Solid, *read* the ſaid
p. 104. *l.* 5. *for* panded, *read* tracted
p. 116. *l.* 21. *Bolonian*
p. ibid. l. 23. Motion in the Dark,
p. 117. *l.* 10. *for* poſite, *read* poſe it.
p. ibid. l. 15. Eclipſe ;
p. 129. *bottom line.* the Light back,
p. 133. *l.* 18. *for* broke ? *read* both ?

Page 87. *line* 19. *perhaps ſhould be read* —— did not let out the Light ; —— out *ſeems to be wanting.*

Perhaps line 15 *and* 16 *of page* 84 *ſhould be read* —— which the Bottom contains, if it could be managed ſo as not to melt, would expand

BRITISH
29 AP 92
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